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ABSTRACT

This report contains findings from a technology needs assessment conducted at historically black colleges and universities (HBCUs). The study assessed the computing resources, networking, and connectivity of HBCUs and other institutions that provide educational services to predominantly African American students. Out of 118 HBCUs, 80 responded to questions about campus planning and policies, facilities and resources, connectivity, and campus network infrastructures. Of those 80 HBCUs, 98 percent had basic access to the Internet, World Wide Web, and campus networks. However, there were serious concerns with the digital divide in the areas of: student access to networking and computing resources; usage of higher bandwidth technologies for accessing the Internet, World Wide Web, or other networks; faculty utilization of Web-based resources in the classroom and in professional exchange and development; awareness of the importance of network security; and utilization and maintenance of technology strategic plans to incorporate innovation and update changing technology. These problems were particularly noticeable at smaller, private, rural institutions. Six appendixes include a U.S. Department of Commerce press release; participating HBCUs; references; information about the National Association for Equal Opportunity in Higher Education; information about the study team; and the study instrument. (Contains 10 references.) (SM)

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HISTORICALLY BLACK COLLEGES and UNIVERSITIES

An Assessment of Networking and Connectivity

OCTOBER 2000

UD033941

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HISTORICALLY BLACK COLLEGES AND UNIVERSITIES

An Assessment of Networking and Connectivity

Prepared For

U.S. Department of Commerce
National Telecommunications and Information Administration
Technology Opportunities Program
Norman Y. Mineta, Secretary

Prepared By

National Association for Equal Opportunity in Higher Education
Henry Ponder, Chief Executive Officer and President
Mildred Freeman, Director, Sponsored Programs
Stephanie Myers, Principal Investigator

October 2000

Note: Any views, findings, conclusions, or recommendations expressed in this report are those of the authors and do not necessarily represent the official views, opinions, or policies of the U.S. Department of Commerce.

THE SECRETARY OF COMMERCE
Washington, D.C. 20230

The Department of Commerce is proud to release *Historically Black Colleges and Universities: An Assessment of Networking and Connectivity*. This report contains findings from a technology needs assessment conducted at Historically Black Colleges and Universities (HBCUs) by the National Association for Equal Opportunity in Higher Education (NAFEO) for the National Telecommunications and Information Administration (NTIA). The study assesses the computing resources, networking, and connectivity of HBCUs and other institutions that provide educational services to predominantly African-American students.

The findings of this report are encouraging. Ninety-eight percent of the HBCU respondents reported having basic access to the Internet, World Wide Web, and campus networks. It is clear that significant numbers of our Nation's historically black institutions stand poised to make a "digital leap" into the 21st Century. Nonetheless, the report suggests that during this era of continuous innovation and change, continual upgrading of networking and connectivity is critical if these institutions are to take advantage of telecommunication opportunities such as Internet2 and third-generation wireless services. Presently, most HBCU campus networks rely on T-1 connectivity and over 75 percent of their students rely on campus computer labs to access the Internet and World Wide Web. This is especially interesting to note, since the recent trend in our Nation is that the laptop, along with the pencil, is becoming part of the standard set of school supplies for elementary schools.

The NAFEO technology assessment study provides a much-needed baseline of information about the technological preparedness of one of our Nation's valuable resources, HBCUs. We now have a benchmark to use in measuring the degree to which our institutions are keeping pace with change. Findings from the assessment serve as an important blueprint for support from the private sector, business and industry, and nonprofit organizations for the digital inclusion of a community of over 350,000 students and future leaders attending these institutions of higher education. Results from this study will assist both the Department and NAFEO to advise HBCU leaders, Federal and State Government, and the private sector about the strengths and shortfalls of our institutions. Finally, this report should serve as a useful tool for the institutions as they continue to plan for the future.

Along with Dr. Henry Ponder, Chief Executive Officer and President of NAFEO, I am happy to report that, in spite of overwhelming odds, the majority of HBCU Presidents and Chancellors have risen to the challenge and have "wired" their campuses. This report clearly outlines further avenues of research, suggestions for cross-cutting dialogue, and blueprint for future support.

Norman Y. Mineta

FOREWORD

The National Association for Equal Opportunity in Higher Education (NAFEO) has the unique charge of advocating on behalf of one of America's most precious treasures --118 Historically Black Colleges and Universities (HBCUs), located in 24 States, the District of Columbia, and the Virgin Islands. Each year, these institutions graduate fine young people with undergraduate, graduate, and doctoral degrees, who go on to make enormous contributions to American society and abroad.

An essential part of NAFEO's mission is to advocate on behalf of policies and initiatives that can improve the quality of education for students attending HBCUs. We work with Presidents and Chancellors at 118 HBCUs, as well as other institutions that serve predominately African-American student populations, to insure that our young people receive an education equal to that acquired anywhere in the world.

We all realize the information revolution is changing the landscape of education forever. That is why we wanted to gain an overall assessment of where HBCUs are on the *Information Super Highway*. This way we can determine whether our institutions are "keeping pace" with change or whether they have been seriously impacted by the *digital divide*. Results from this study will assist us to advise HBCU leaders, Federal and state governments, and the private sector about the strengths and shortfalls of our institutions. Most importantly, we must monitor how HBCUs are providing access for students to the Internet, World Wide Web, and other important networks.

Based on the results of this study, I am happy to report that, in spite of overwhelming odds, the majority of HBCU Presidents and Chancellors have risen to the challenge and have *wired* their campuses. However, it is clear from the findings that there are serious digital divide issues that affect the ability of HBCUs to be competitive with other institutions of higher education.

I am saddened to learn from our research that fewer than 25 percent of our students own their own computing resources. This means that in spite of the best efforts of HBCUs, students must often wait hours at labs to use computers in order to gain access to the Internet and the World Wide Web. We must find ways to get more computers in the hands of our students so they can have universal access to global networks.

Another area of concern is whether our faculty and administrators are making full use of the marvelous technology that encourages professional exchange and rewards creative instruction in the classroom. Our results indicate that work is needed in the area of integrating technology into the classroom. HBCU faculty and staff must realize that they will be measured, in coming years, on their ability to participate in networks and provide students with global access to knowledge.

In comparison with other similar technology studies, our findings indicate that HBCUs are just short of *"keeping pace"* with other institutions of higher education. However, I am not satisfied with that result

since *"keeping pace"* in today's ever-changing world of technology is tantamount to standing still. I believe that as minority-serving institutions, we have the first opportunity in the history of America, to leap ahead of the pack if our institutions become aggressive regarding the use of cutting edge technology.

The opportunity to respond to innovation and change should be possible for all HBCUs large, small, urban, rural, public and/or private. I would like to see our institutions develop the capacity to respond quickly and experiment with new innovations. I believe that by working in partnership with the Federal Government, state and local governments and the private sector, we can attempt a grand experiment to launch our institutions onto the cutting edge of the new economy in the 21st Century. Our report finds that overall, our institutions are ready for such partnerships.

I would like to thank Gregory L. Rohde, Assistant Secretary, National Telecommunications and Information Administration; Bernadette McGuire-Rivera, Ph.D., Associate Administrator, Office of Telecommunications and Information Applications; Stephen Downs, Director of the Technology Opportunities Program (TOP); and Francine E. Jefferson, Ph.D., Evaluation Specialist, Technology Opportunities Program, for their leadership and vision that enabled NAFEO to conduct this very important study. Without their commitment, this comprehensive look at the networking and connectivity of Historically Black Colleges and Universities may have been overlooked, as it has been in years past.

My sincere thanks go to the HBCU Presidents, Chancellors, and technology professionals who responded to our requests for information. In addition, I would like to thank our TAS team. Scattered throughout the country, our team studied the HBCUs, analyzed the data, and wrote the report using "virtual" communications. The TAS Team was led by Stephanie E. Myers, Principal Investigator, and includes Antoinette Hubbard, Eugene Royster, William Jordan, Lisa Hughes. Finally, a special thanks to Mildred Freeman, Director of NAFEO Sponsored Programs, and the NAFEO staff who provided support for this special effort.

Henry Ponder, Ph.D.
Chief Executive Officer and President
National Association for Equal Opportunity in Higher Education August 2000

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EXECUTIVE SUMMARY

This report contains findings from a technology needs assessment study of Historically Black Colleges and Universities (HBCUs) conducted by the National Association for Equal Opportunity in Higher Education (NAFEO), a non-profit Black college association representing the interests of 118 HBCUs. This study known as the HBCU Technology Assessment Study, (TAS) was funded by the Technology Opportunities Program (TOP), National Telecommunications and Information Administration (NTIA), U.S. Department of Commerce[1]. The TAS assesses the computing resources, networking, and connectivity of HBCUs and other institutions that provide educational services to predominately African-American student populations.

The TAS began with several fundamental questions...***"Where are HBCUs on the Information Super Highway? Are they on the side of the road, the on-ramp, or speeding along in the fast lanes?"*** To answer these questions, in early 2000, a NAFEO research team took a "snap shot" of the campus networks, computing and networking capabilities, and telecommunications infrastructure of HBCUs.

Out of 118 HBCUs, 80 provided input into the TAS. Of the 38 institutions that did not respond, it is safe to assume that some of these institutions are wired, but simply elected not to participate in the study. Phone conversations with some non-respondents indicated that they were overwhelmed by other requests from companies, foundations, and state and local governments for similar data. However, based on repeated phone calls to a number of the 38 non-responding HBCUs, it became clear that a number of them simply could not respond due to lack of technical personnel capable of responding to technical questions about networking and connectivity. More resources are necessary to dispatch a study team to visit the 38 non-responding institutions and observe firsthand the status of their campus connectivity.

Among the 80 HBCUs, roughly two-thirds of all HBCUs, the TAS found their overall status on the information superhighway as more positive than originally assumed. However, there are serious areas of *digital divide* in the area of student access, high-speed connectivity and insufficient infrastructure, particularly at smaller, rural institutions. Admittedly, the research team began the TAS with a commonly shared belief that many HBCUs were struggling to connect to the Internet via 56kbps lease lines. While TAS finds that HBCUs are connecting to the Internet with more sophisticated technology than 56k lease lines, the study does raise troubling questions about prevailing limited forms of access and connectivity and the lack of strategic plans for incorporating innovation and updating changing technology.

Results of the TAS indicate that most HBCUs are solidly on the *on-ramp* of the information superhighway. Ninety-eight percent of the institutions that responded report the existence of data, voice and/or data and voice campus networks at mostly T-1 connectivity speeds. While TAS findings indicate that HBCUs have basic access to the Internet, World Wide Web and campus networks, examination of the data finds that there are troubling *digital divide* concerns in the areas of: (1) HBCU student access to networking and

[1] TOP was formely named the Telecommunications and Information Infrastructure Assistance Program (TIIAP)

computing resources; (2) HBCUs usage of higher bandwidth technologies for accessing the Internet, World Wide Web, and other networks; (3) faculty utilization of Web-based resources in the classroom; (4) awareness of the importance of network security; and (4) utilization and maintenance of technology strategic plans. One finding that particularly concerned the TAS team was that private HBCUs, located in rural areas with student populations of 999 or less, report a significant gap in connectivity, equipment, student access, and overall computing resources.

In our view, in light of the overall positive picture of networking and connectivity among HBCUs, it is possible for significant numbers of these institutions to make a *digital leap* into the 21st Century. However, such a leap will require focus of institutional resources to address several areas of weakness: (1) improvement of high-speed connectivity rates; (2) dramatic improvement of student to computer ownership ratios; (3) improvement of the strategic planning process; and (4) willingness to incorporate innovative technologies into campus networks.

While it is reassuring to find that HBCUs are not in the "dark ages" of networking and connectivity by providing access for students and faculty to the Internet and World Wide Web, the TAS Team is concerned that the strategies to upgrade and improve network systems are generally weak. During this era of continuous innovation and change, continual upgrading of networking and connectivity systems is critical if HBCUs are to continue to cross the digital divide and not fall victim to it. Failure to do this may result in what is a manageable digital divide today, evolving into an unmanageable digital gulf tomorrow.

In reviewing the results of this TAS of HBCUs, many questions emerge from the data that would benefit from further research. Monitoring the status, growth, and expansion of HBCUs on the information superhighway is an important, even historic, effort and NAFEO plans to continue to be on the cutting edge of such research.

In closing, we would like to extend our appreciation to Dr. Henry Ponder, Chief Executive Officer and President, NAFEO, for providing top-level leadership to involve the HBCUs in the TAS; to Stephen Downs, Director, TOP Program; and Francine E. Jefferson, Ph.D., Telecommunications Policy Analyst, TOP Program, for their vision and support; to Mildred Freeman, Director of Health Education/Sponsored Programs, NAFEO, for her management expertise; to Steve Pruitt, Executive Vice President of the United Negro College Fund, for his early assistance with development of the TAS instrument; to Dr. Celine Alvey, Associate Vice President for Information Services, Florida Institute of Technology, for sharing her "lessons learned" from a similar Florida study; to James Harrington, Director, Minority University Space Interdisciplinary Network program, National Aeronautics and Space Administration, for his perspective regarding the technology capacity of HBCUs; to Roy J. Myers, President, R. J. Myers Publishing and Consulting Company, for his counsel and guidance; to NAFEO Staff Alicia Vargas, Statistician, for her hard work and statistical analysis; to Ashley Bell, Computer Specialist, for her technical expertise and to Regina Norman, for her editorial assistance.

Respectfully Submitted,

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1.0 INTRODUCTION

The Historically Black Colleges and Universities Technology Assessment Study (TAS) contains findings from a technology needs assessment of 80, or 67 percent, of 118 Historically Black Colleges and Universities (HBCUs), in the United States, and Virgin Islands. TAS was conducted by a team of researchers assembled by the National Association for Equal Opportunity in Higher Education (NAFEO), a non-profit public policy advocacy association that represents the interests of 118 public and private HBCUs. This study was funded by the National Telecommunications and Information Administration's Technology Opportunities Program (TOP), U.S. Department of Commerce, Broad Agency Announcement No.98-01[2]. The TAS assesses the computing resources, networking, and connectivity of HBCUs and other institutions that provide educational services to predominately African-American student populations.

In an October 7, 1999, press statement announcing the TAS, William M. Daley, former Secretary of Commerce, declared, *"Access to information resources is critical to taking courses, researching, finding a job or public information...In a society that increasingly relies on computers and the Internet to deliver information, it is important to ensure that all Americans have access to information technology so that they can continue to be a part of our economic growth and prosperity." (See Appendix A for Press Release.)*

HBCUs educate significant numbers of African-American professionals in the disciplines of higher education at the baccalaureate, masters, doctoral, and post-doctoral levels. These predominately African-American students go on to lead important institutions in their communities and contribute to our Nation's productivity in all of the major industry sectors including the emerging technology sectors vital to the new economy. In keeping with Secretary Daley's statement, the TAS was developed out of the desire to ensure that graduates of HBCUs have equitable access to and utilization of information technology so that they can actively participate in the technology-based workforce of the future.

1.1 Background

NAFEO's interest in conducting the TAS was prompted in part by a report issued by the U.S. Department of Commerce, *Falling Through the Net*[3]. This report indicated that as of July 1999, whites were more likely to have access to the Internet from home than blacks or Hispanics from any location. The report also found that black and Hispanic households were approximately one-third as likely to have home Internet access as households of Asian/Pacific Islander descent, and roughly two-fifths as likely as white households. And, rural areas were less likely to be connected than urban areas. Regardless of income level,

[2] The TOP Program was formely known as the Telecommunications and Information Infrastructure Assistance Program (TIIAP), National Telecommunications Information Administration, U.S. Department of Commerce.

[3] Falling Through the Net, U.S. Department of Commerce, July 2000

those living in rural areas were lagging behind in computer and Internet access. At some income levels, those in urban areas were 50 percent more likely to have Internet access than those earning the same income in rural areas. *Falling Through the Net*, termed these discrepancies the *"digital divide."* The TAS focus was whether a *digital divide* was present among HBCUs and, if so, whether such a *digital divide* would reflect itself in differences in connectivity, access, and computing resources among different kinds of HBCUs, such as those institutional characteristics including urban, rural, public, private, large or small.

Another event that prompted NAFEO's concern about the status of HBCUs on the information highway, was a survey published in the May 1998 edition of *YAHOO's Internet Life*[4]. In an article titled, *America's 100 Most Wired Colleges*, not one HBCU was listed among the 1998 list of the 100 top universities and colleges. However, it should be noted that the year 2000 update of the YAHOO study reports that three HBCUs made the list.

The YAHOO list, coupled with *Falling Through the Net* and media coverage about the *digital divide* generated interest at NAFEO to find out the facts about the status of networking and connectivity at HBCUs. NAFEO also wanted to determine the extent and scope of campus networks. In order to determine with some degree of accuracy the facts about the networking and connectivity of HBCUs, NAFEO approached the National Telecommunications and Information Administration at the U.S. Department of Commerce with first an unsolicited proposal and later a proposal submitted under a Broad Agency Announcement contract program.

1.2 National Association for Equal Opportunities in Higher Education's Long Term Goals

NAFEO's long-term goals for the results of the TAS are tied to the overall objectives of finding ways to promote, support, and assist HBCUs as they strive to compete in the 21st Century. NAFEO's mission is to foster a positive environment for the achievement of the following long-term goals:

Goal 1: To strengthen the capacity of HBCUs to participate in the national effort to improve the Nation's technology and telecommunications infrastructure;

Goal 2: To improve the quality of education for students attending HBCUs, by encouraging policies and leadership that support the telecommunications infrastructure necessary for campus wide connectivity; and

Goal 3: To strengthen NAFEO's capabilities and role as a national service organization that provides research, evaluation, and dissemination of information about telecommunications and technology infrastructure to HBCUs and minority institutions.

[4] Yahoo Internet Life, "100 Most Wired Campuses," May 1998

1.3 Presentation of Results

Data in the TAS report are presented in the aggregate, rather than identifying the particular strengths and weaknesses of individual institutions. Keeping in mind NAFEO's mission to strengthen the capacity of all HBCUs, the TAS research team sought to ensure that answering questions regarding institutional capacities and capabilities would be done forthrightly, without concern for perceived institutional liabilities by institutions not yet on the cutting-edge of technology. Therefore, the TAS presents an overall picture of HBCUs and does not include individual school profiles.

For comparison, the TAS refers to two other campus technology assessment studies. First, the 1999 Campus Computing Study, conducted by Kenneth Green, Visiting Scholar, Claremont Graduate University, provides a baseline to determine whether or not HBCUs are keeping pace with other institutions of higher education in networking and connectivity technology, and whether the policy issues facing their institutions are similar or different. The second reference used as baseline data for TAS findings is the *YAHOO Internet Life 100 Most Wired Campuses Annual Survey*. We used survey findings for years 1998, 1999, and 2000.

1.4 Structure of the Report

The TAS report is organized in five major sections:

- Section 1: Introduction
- Section 2: TAS Methodology
- Section 3: TAS Areas of Inquiry
- Section 4: TAS Findings
- Section 5: TAS Conclusions
- Section 6: Appendices

2.0 TAS METHODOLOGY

The TAS methodology included a research design based on standard needs assessment practices, including identification of the target population, design of an assessment instrument, pilot test of that instrument, and revision and distribution of the instrument to the target population and compilation and analysis of results into a report.

2.1 Characteristics of the target population

There are 106 Historically Black Colleges and Universities (HBCUs), 104 of which participate with NAFEO. HBCUs are defined as postsecondary institutions founded prior to the Civil Rights Act of 1964 with the primary objective of educating African-Americans. There are 14 other colleges and universities that are referred to by NAFEO as "Other Equal Opportunity Educational Institutions" (EOEI). These institutions were founded after 1963 and enroll a plurality of blacks and other minorities. (Vargas, 2000.)

It should be noted that the number of institutions identified as HBCUs fluctuates according to standards set by the U.S. Department of Education. However, for the purposes of the TAS, the definition of HBCUs is based on a report compiled by NAFEO, *A Status Report of the Historically Black Colleges and Universities and NAFEO's Other Equal Opportunity Educational Institutions*. According to NAFEO, "HBCUs are postsecondary institutions founded prior to the Civil Rights Act of 1964 with the primary objective of educating blacks." (Vargas, February 2000).

HBCUs and EOEIs are located in 24 states, the District of Columbia, and the Virgin Islands and are found in large urban cities, suburbs, and small rural towns. They serve a campus community of over 350,000 students, many of whom graduate to become leaders of major institutions, including government, business, and education. The institution's focus on liberal arts, business, agriculture, research, science, and technology and graduate more African-American students who become professionals in medicine, dentistry, pharmacy, and teaching than all other institutions in the United States. Forty-six percent of HBCUs are public institutions funded by their state governments, and 54 percent are private institutions, a number of which are supported by national religious denominations. HBCUs and EOEIs include accredited two-year, four-year, and graduate and professional institutions.

HBCUs and EOEIs have multiracial staffs that provide educational services to increasingly diverse student populations, including white students. While most are located in the South, there are HBCUs in the Midwest, Mid-Atlantic Region, the Far West, and the Virgin Islands.

2.2 Research Approach

TAS was conducted by a team of five researchers located in five cities: Washington, DC; Cincinnati, OH; Silver Spring, MD; Kalamazoo, MI; and Detroit, MI. The TAS team met in a virtual environment using online technology as the mechanism for most of the communication. Team members included a public policy specialist, a professional evaluator and research consultant, two telecommunications professionals, and one Internet entrepreneur. NAFEO provided in-kind staff support to the team in the form of executive leadership, program monitoring, statistical analysis, computer programming, meeting facilities, and logistical support.

The first task of the TAS Team was to design a needs assessment instrument tailored to the issues that were relevant to HBCUs. To obtain input for this instrument, the team conducted a literature search to identify similar studies and solicited input from a variety of sources. These sources included review of a technology assessment instrument used by the United Negro College Fund (UNCF) for a 1999 technology assessment of UNCF institutions; obtaining input for critical areas of inquiry from James Harrington, Director, Minority University Space Interdisciplinary Network (MU-SPIN) program of the National Aeronautics and Space Administration (NASA); Consultation with Dr. Celine Alvey, Director of a 1997 technology assessment of the Florida Independent Colleges; and personal interaction with heads of technology attending the 1999 Clark Atlanta University HBCU Educational Technology Expo. (See Appendix B for TAS Instrument.)

Additional input for the instrument was obtained from reference documents on the Internet, articles appearing in journals of higher education such as the *Chronicle of Higher Education*, and professional reports and studies. (See Appendix C for Listings.) The team also conducted on-going consultation with TOP Evaluation Specialist, Francine E. Jefferson, Ph.D., for continuous review of the instrument, development of research strategy, and analysis of findings.

2.2.1 TAS Respondents

In order to identify the appropriate respondents for completion of the TAS Instrument, Presidents and Chancellors of participating institutions were asked to refer the instrument for completion to individuals at their institutions who had broad knowledge about the institution's computing capability. These respondents provided the data for TAS.

2.2.2. Pilot Test of Assessment Instrument

The TAS instrument was pilot tested with ten HBCUs. The pool of ten pilot test institutions was balanced to include urban and rural institutions, large and small, public and private. Upon receipt of comments from the pilot test institutions, modifications were made in some of the questions including in the TAS instrument.

An assessment instrument including input from the pilot test was distributed to all 118 HBCUs with the request to complete and return it to NAFEO. Eighty-three institutions indicated that they would participate in the TAS and out of that number, 80 institutions, or 96 percent of the number who promised to

participate, followed through. The results of those returns are summarized in this report. The 80 participating institutions represent 67 percent of the total number of 118 NAFEO designated HBCUs.

2.2.3 Non-Participating Institutions

The TAS Team followed up several times with the 38 institutions that declined to participate in the TAS. The Team's observations regarding why the 38 institutions did not participate include direct and anecdotal feedback such as: (1) lack of technical staff, (2) being overwhelmed by corporate, foundation, and local government studies seeking similar data, (3) inactive members of NAFEO, and (4) lack of interest. Note: Less than 1 percent of HBCUs returned their responses after the final deadline and could not be included in the study.

3.0 TAS AREAS OF INQUIRY

The objective of the TAS was to gain an overall perspective of the networking capabilities and connectivity of HBCUs. The assessment instrument was developed to obtain data that would evaluate the capacity of HBCUs to function as part of the national and global network. The emphasis was not so much on individual institutions, but on a distinct community within the higher education environment. Therefore, assessment inquiries were designed to obtain comprehensive information with the intent to discern trends. Described below are the categories and rationale for inquiry including:

- Institutional Information
- Campus Planning and Policies About Computing
- Campus Facilities and Computing Resources
- Campus Connectivity
- Campus Backbone
- Organization Access and Connectivity Environment
- Multimedia and Distance Learning

3.1 Institutional Information

The first version of the instrument requested a range of data regarding the demographics of the institutions. However, in response to comments made by institutions during the TAS Pilot Test, the final TAS instrument was revised to limit inquiry into demographic information. Instead, in compliance with requests from Pilot Test institutions, demographic data such as campus population size was based on data collected by NAFEO in its annual survey of HBCUs titled, *A Status Report of the Historically Black Colleges and Universities and NAFEO Other Equal Opportunity Educational Institutions.*(Vargas, 2000)

3.2 Campus Planning and Policies

The TAS focused on the institutional practice of planning for technological needs and usage and on the existing policies related to student computer competency. Such information is important because the

future of HBCUs utilization of technology is dependent upon their commitment to make strategic decisions and plans that align organizational practices with institutional goals.
Strategic planning usually means that an institution commits itself to a review and update of its accomplishments compared to its plans. These procedures focus on the organization's attention to a common purpose. Having no plan is, in fact, a strategic plan decision and is important information. Institutions were asked about the existence of strategic plans and the updating of those plans. TAS inquired into the policies guiding the behaviors and expectations of institutions regarding networking and connectivity using the theory that networking and connectivity policies should be based on strategic plans. TAS also attempted to elicit information about the expectations of participating HBCUs regarding student computer competency and use in order to better understand the planning process.

3.3 Campus Facilities and Computing Resources

TAS reviewed HBCU facilities and resources in order to assess student-to-computer ratios. The study reviewed the ownership of computers on campus, types of computers available, and whether the equipment was institutionally owned, leased, or personally owned by faculty and/or students. Further, it determined student/faculty access to those computers and location of workstations.

Assessments were made about the percentages of computers available on HBCU campuses. This section also asks about the numbers of buildings on campuses with updated wiring and estimated percentages regarding the total number of campus buildings that have been updated.

3.4 Campus Connectivity

One of the core concerns in the TAS is the composition and makeup of the network with regard to its ability and capacity for connectivity. This assessment requires an understanding of the capacity of HBCUs to share and access information both globally and locally on campus. A full understanding of the technological environment must include a look at the local telephone company and Internet service provider (ISP) since local telephone company and ISP infrastructures are an important part of this picture. If an institution's network is based on wiring and cable, the ability of an HBCU to access global and national networks is dependent upon the *last mile*. The *last mile* is defined as "the connection between the customer and the telephone or cable company." [5]

The TAS began with the question of the basic minimum requirement-is there a campus network? Following the determination of a basic "in place" network, an assessment was made about local service providers. The TAS objective was to have an assessment of the infrastructure capabilities of the telecommunications and ISPs for located in urban and rural areas. While access to broadband width may be available in many urban areas, the study, *Advanced Telecommunications in Rural America*, reports "rural areas are currently lagging far behind urban areas in broadband availability." (U.S. Dept. of Commerce/U.S.Dept of Agriculture, 2000.) The TAS team wanted to assess how the lag in access to broadband technology affected rural HBCUs.

[5] Definition from TechEncyclopedia, www.techweb.com, 2000

To facilitate evaluation of the data about the bandwidth and accessibility resources of HBCUs, the TAS team decided to establish an internal standard or baseline of minimal connectivity for the study. The team considered variables such as current market options, speed rate of connections, and the range of costs for connecting to networks by 56kbps, T-1, T-3, DSL, satellite, etc. After reviewing the options, the team decided that for the purpose of the TAS the minimum standard of access would be T-1 capability. In the view of the TAS team anything less than T-1 would indicate severe limitations for an institution to gain access to an Internet world and its resources. The internal standard for connectivity was based on notion that the more bandwidth capacity at HBCUs-the more possibilities.

Information was requested about student access to computing resources. These responses were compared with findings in the Campus Computing Study to gain a relative perspective about student access to computers at other institutions outside of the HBCU community (Green, 1999). TAS also obtained general data regarding the types of connections that are used by individual departments at HBCUs, and what the approximate overall institutional costs are for IT services. This information helps to provide a benchmark about the capabilities and resources of individual departments. For example, are engineering departments able to provide enough bandwidth for scientific work or are new uses of technology being visualized by departments of humanities or language arts?

3.5 Campus Backbone

For the purpose of the TAS, the "campus backbone" is defined as, "the part of the network that handles the major traffic and employs the high-speed transmission paths in the network..."[6] The TAS sought to gather information about campus network infrastructures. This area was important since the delivery of computing services to institutions is dependent on the computing backbone. Computing backbones affect the quality of the tools and pathways for connecting to the Internet, the computing resources and productivity and ultimately the capacity, output, and expandability of a campus network. Design of the architecture for virtual private networks and/or inter-campus connectivity are based on the capacity of campus backbones.

In order to assess the location of highly technical capacities on campuses, TAS inquired into the location of specialized workstations. For the purpose of TAS, specialized workstations are considered to be those workstations that are optimized in terms of hardware and software configuration to meet very specific demands such as modeling, statistical analysis, graphic arts, remedial learning, etc. Knowing what kinds of systems are distributed across campuses provides a perspective of whether high end computing power is being used at the departmental and academic levels or by the administrative functions. If workstations are used by technical or liberal arts programs, this data may show whether HBCUs are using technology to address specific problems that require high levels of support services and capital investment.

In this era of proliferating computer viruses that violate network security, the ability of all major institutions, including HBCUs, to secure their systems is a priority. The issue of network security was included in the study since decisions regarding the architecture of network security must be made simultaneously with decisions about which applications and data will be made available on the campus networks. Poor planning or the lack of understanding of the importance of network security may slow full utilization of investment in computing technology at HBCUs, particularly as Government and industry

[6] TechEncyclopedia, www.techweb.com

become more security conscious. The capacity of HBCUs to ensure network security could affect their capacity to participate in various types of grants, contracts, and partnerships.

3.6 Organization, Access, and Connectivity Environment

Data was obtained to assess the applications, access, and effectiveness of the campus networks with emphasis being paid to the usage priorities of the institutions, such as use of technology in the classroom, advanced research, professional collaboration, etc. This data would offer insight into whether HBCUs are aware of and emphasizing the collaborative, global, and resource aspects of the Internet world or if the campus networks are closed institutional islands, cut off from the larger educational community.

3.7 Multimedia and Distance Learning

TAS also asked about the use of media, instructional technology, and distance learning in order to determine what types of audio-visual, video, audio, and videoconferencing equipment are available. This section also sought to determine whether institutions are currently involved with distance learning and what their future plans may be regarding distance learning degree programs.

4.0 TAS FINDINGS

The results of the TAS are summarized in this section with an emphasis on overall trends within the HBCU community. No effort is made to provide a narrative or analysis of every question asked by the TAS instrument. Rather, this section attempts to reveal insights into the overall computing capacity of HBCUs and the scope of their networks.

No specific data are available regarding the networking and connectivity of the 38 institutions that did not respond to the TAS. However, anecdotal evidence indicates that non-responding institutions may have been: (1) overwhelmed with requests for computing information from state governments, non-profit organizations, and commercial companies; (2) short of the staff capacity to respond to technical questions about networking and connectivity; or (3) in-active members of NAFEO.

The results in this section are based on the 80 HBCUs who responded to either the entire TAS Assessment Instrument or the TAS Core Questions Instrument. The information in this section is organized under the following headings:

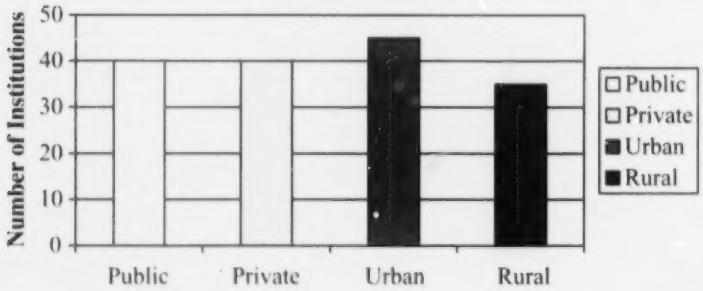
- Characteristics of Reporting Institutions
- Institutional Planning and Expectations
- Student/Computer Ratios and Access to Computing Resources
- Connectivity, Capacity, and Facilities
- Campus Backbone
- Web-based Services, Distance Learning, and Multimedia
- Administrative and Management Concerns

4.1 Demographics of Reporting Institutions

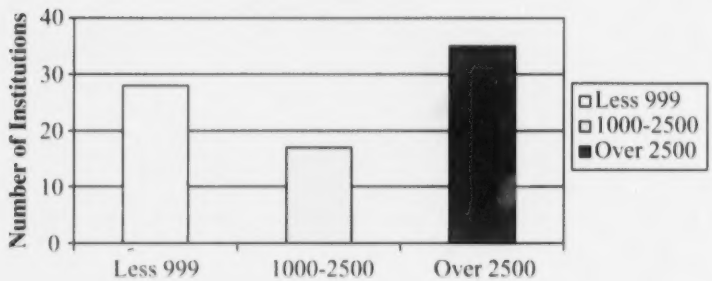
Of those 80 institutions participating in TAS, 74 are HBCUs and six are EOEIs. (See Appendix B for Participating HBCUs.) Forty-five, or 56 percent of the participating HBCUs, are located in urban or suburban centers, and 35 of the institutions, or 43 percent, are located in small town or rural settings. Of the reporting institutions, 40 HBCUs are public institutions, and 40 are private. Eleven of the participating HBCUs are two-year institutions, 68 are four-year institutions, and one is a graduate institution.

The urban and rural definitions used in the TAS were derived from *Peterson's College Guide for Four-Year Institutions and Peterson's College Guide for Two-Year Institutions*. The information from the college guides, together with the demographic data from the NAFEO annual report and responses to the TAS instrument, provided the TAS Report with sufficient data to demonstrate an overall "snap shot" of the computing resources of all reporting institutions, and to draw out meaningful comparisons of urban institutions with rural, public institutions with private, and large institutions with smaller ones. **(See Charts 1a and 1b.)**

PARTICIPTING HBCUs BY PUBLIC/PRIVATE & URBAN/RURAL
Chart 1a



PARTICIPATING HBCUs BY ENROLLMENT
Chart 1b



4.1.1 Significance of Demographic Characteristics

From an overall perspective, the data from reporting institutions revealed clear trends among all of the HBCUs regarding networking and connectivity access, connectivity speed rate, types of vendors, student access to computing resources, etc. However, when certain factors are considered, such as the campus population of HBCUs, whether they are public or private, or whether they are located in urban or rural areas, differences begin to emerge. For example, most of the public HBCUs located in urban centers are

the larger schools with 2,500+ students, while the private, rural HBCUs tend to serve fewer than 999 students. Public HBCUs have more access to public resources from local or state government networking systems while private institutions may not have access to those resources. Urban HBCUs have more options for access to technology than rural ones.

The categories of public and urban appear to track similar data while private and rural schools have similar findings. The size of the school and its location are relevant since these characteristics may affect the distribution of computing resources available to different institutions.

4.2 Institutional Planning and Expectations

4.2.1 Computer Competency Requirements

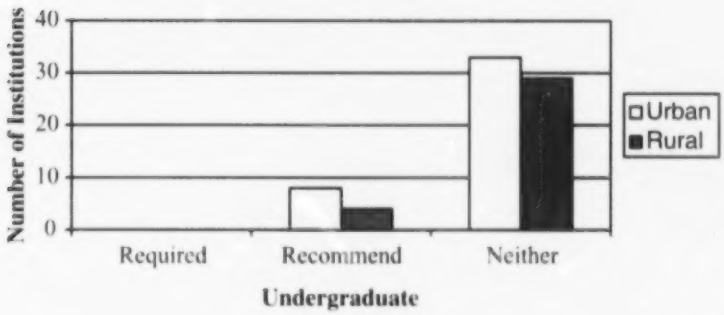
An important indicator of institutional readiness for technology is the expectation of institutions regarding computer training and computer usage by their students. Of the 80 reporting institutions, 55 percent indicated that they have a computer competency requirement, which is usually an introductory course in computer usage. Of that number, 47 percent of the public HBCUs require computer competency while a higher percentage, or 62.5 percent of the private institutions, require it. Sixty-five percent of the urban institutions require computer competency while 45 percent of the rural HBCUs have the requirement.

In the 1999 Campus Computing Study (Green, 1999), 39.3 percent of all colleges and universities nationwide had a computer competency requirement. It is interesting to note that ***as of spring 2000, 55 percent of HBCUs required some level of student computer competency, a number higher than Green's 1999 finding that 39 percent of all U.S. colleges and universities required student computer competency.***

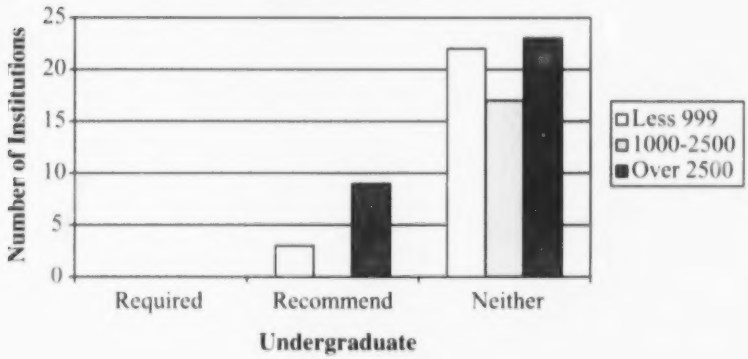
4.2.2 Policies Regarding Computer Ownership

None of the HBCUs reported policies that require student computer ownership and 15 percent of the HBCUs reporting indicate that they recommend student computer ownership. Among the urban and rural HBCUs, 17 percent of the urban institutions recommend that students own their own computers and 11 percent of the rural HBCUs have such recommendations. Even among larger HBCUs, less than 15 percent of HBCUs with enrollments of 2,500+ recommend computer ownership. When asked if they recommend computer ownership for individual units or academic programs (e.g., computer science, physics, etc.), only eight institutions, or 10 percent, indicated that their institutions make recommendations by discipline. The TAS finds that ***NONE of the 80 responding HBCUs require undergraduate students to own computers and only 15 percent recommend student computer ownership-both policies may affect on-demand student access to networks.*** **(See Charts 2a and 2b on next page.)**

HBCUs REQUIRING UNDERGRADUATE STUDENT COMPUTER OWNERSHIP (URBAN/RURAL 2a)



HBCUs REQUIRING UNDERGRADUATE STUDENT COMPUTER OWNERSHIP (ENROLLMENT 2b)



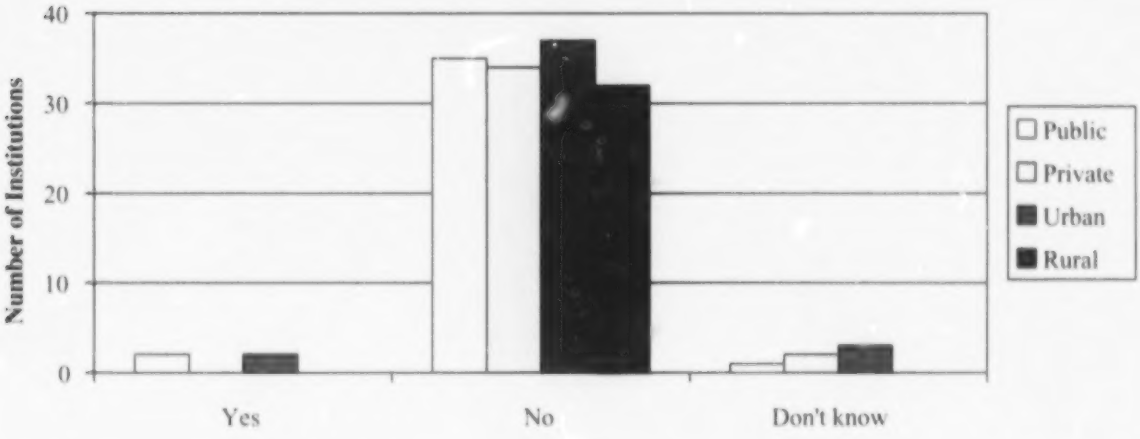
Regarding ownership policies, these findings are not that different from results of the campus computing study, which indicates that out of 530 institutions of higher education surveyed, only 2.7 percent have policies requiring student ownership of computers (Green 1999). However, the campus computing study indicates that 30.5 percent of the institutions surveyed do recommend student ownership of computers. ***Only 15 percent of HBCUs recommend that students own their own computers, compared to 30.5 percent of all institutions of higher education, which recommend that students own their own computers.***

4.2.3 Financial Aid for Computer Purchase

To determine whether financial aid is available to assist students with computer ownership, TAS asked whether institutions currently provide any form of assistance to students to purchase computers. ***Of the 80 responding institutions, only two institutions, or 3 percent, indicated that financial aid was available from their institutions to assist with the purchase of computers***. These institutions went on to indicate that the form of financial aid was a discounted price from computer manufacturers.[7] **(See Chart 3a.)**

[7] Due to a February 2000 agreement signed between NAFEO and Gateway Computers, discounted computers are now available to all HBCUs and their students.

HBCUs PROVIDING FINANCIAL ASSISTANCE FOR STUDENTS TO ACQUIRE COMPUTERS (PUBLIC/PRIVATE & URBAN/RURAL) Chart 3a

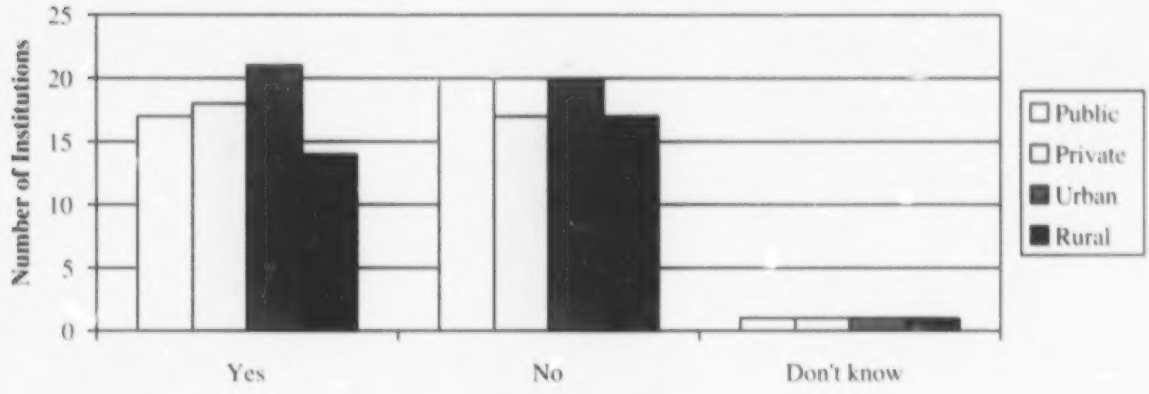


If financial aid is not available, why do not students use their own funds to purchase computers and bring them to campus? According to the report *Money Matters: The Impact of Race/Ethnicity and Gender on How Students Pay for College*, more than 36 percent of African-American students have income and assets that are so limited that the government does not expect them to make any contribution to their college education. Another 25 percent of African-American students are expected to contribute only $2,500 annually. And among HBCU students paying their own way through college, almost 64 percent have annual incomes of less than $20,000, and 39 percent have incomes less than $10,000 (American Council on Education 1999). In response to this data the TAS Team concludes, ***the limited financial status of African-American students makes it difficult for HBCU students to have the financial resources to purchase their own computers.***

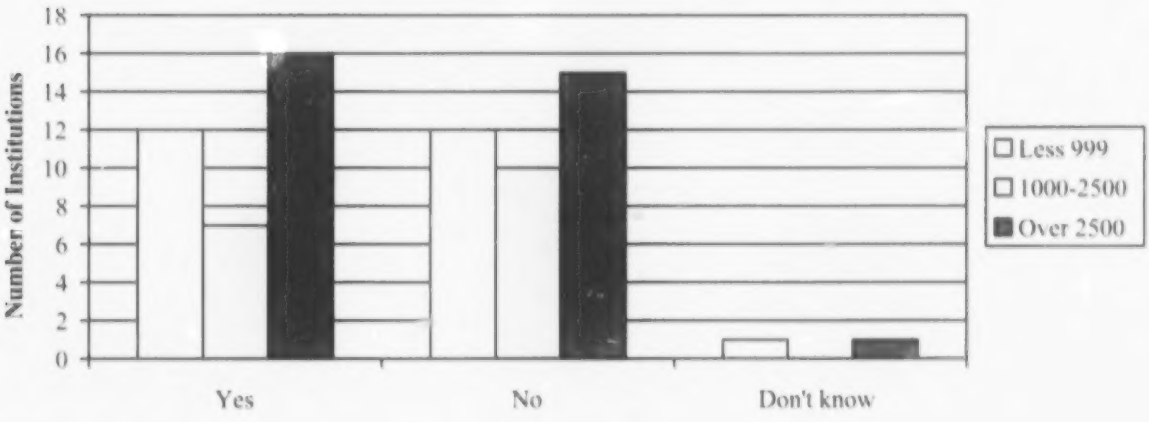
4.2.4 Institutional Computer Use Fees

TAS inquired whether institutions are imposing computer usage fees on students for access to computing. Among the 80 responding HBCUs, 43 percent report charging students a user fee with the fees ranging from $10 - $237 annually. Fifty percent of the urban institutions report imposing a user fee while 40 percent of the rural institutions impose user fees. **(See Charts 4a and 4b on the next page.)**

HBCUs WITH COMPUTER USE FEES (PUBLIC/PRIVATE & URBAN/RURAL), Chart 4a



HBCUs WITH COMPUTER USE FEES (ENROLLMENT), Chart 4b



According to the Campus Computing Study, (Green, 1999) the average technology fee among all reporting institutions was $125, with private universities charging the most at $186 and public universities charging $137. Among HBCUs, the average computer usage fee is about $79. Rural institutions charge slightly lower fees than urban ones.

4.3 Student Access to Computing and Networking Resources

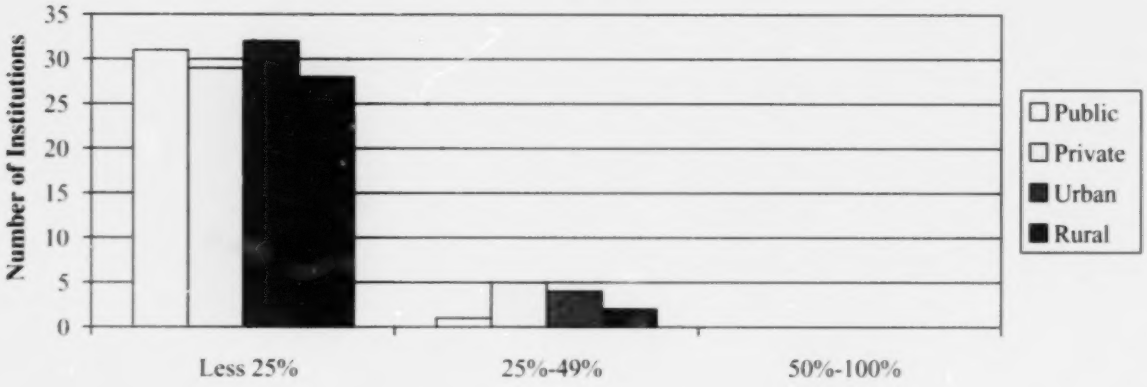
4.3.1 Student Ownership of Computers

A key to ensuring networking and connectivity for students is to provide them with full and ready access to computing resources. According to a 1996 strategic plan prepared for University of California at Los Angeles, providing students access to information technology services *"...generally requires access to a*

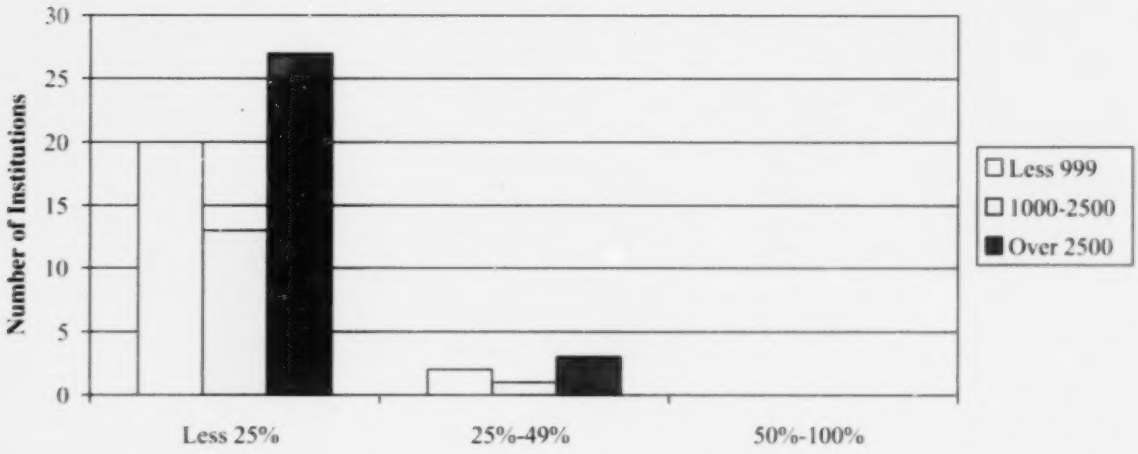
networked desktop computer, appropriate software and adequate support so that equipment and software can be effectively used." (UCLA Technology Strategic Plan, 1996.)

To determine student ownership of computing resources, TAS inquired into what percentage of students bring their own computers to campus. ***Of the 80 HBCUs participating in TAS, 76 percent estimate that fewer than 25 percent, or only 1 out of every 4 HBCU, students personally own computers.*** **(See Charts 5a and 5b.)** This finding is consistent across HBCUs whether they are urban, rural, public, private, large, or small.

STUDENTS BRINGING THEIR OWN COMPUTERS TO HBCUS (PUBLIC/PRIVATE & URBAN/RURAL) Chart 5a



STUDENTS BRINGING THEIR OWN COMPUTERS TO HBCUS (ENROLLMENT) Chart 5b

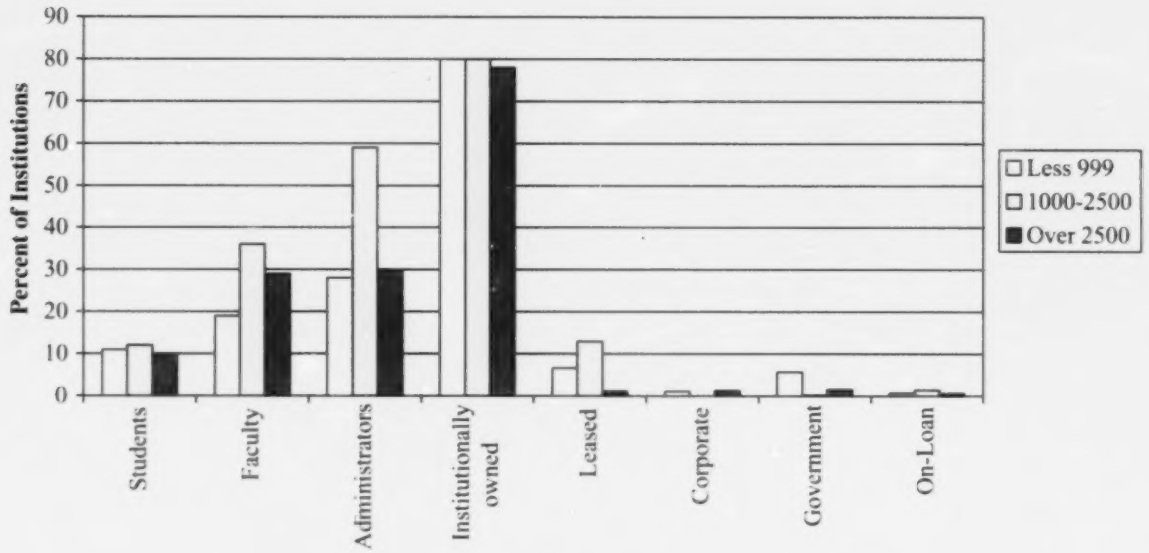


Nine percent of urban HBCUs indicated that 25-49 percent of their students have their own computers, while only 5 percent of the rural institutions indicated student ownership in the 25-49 percent range. Seven percent of the respondents indicated that they could not estimate student ownership. ***This finding regarding student ownership of computers contrasts with the 1999 Campus Computing Study, which reports that among all institutions of higher education, 49 percent, or about one out of every two students personally own their own desktop or notebook computers (Green 1999).***

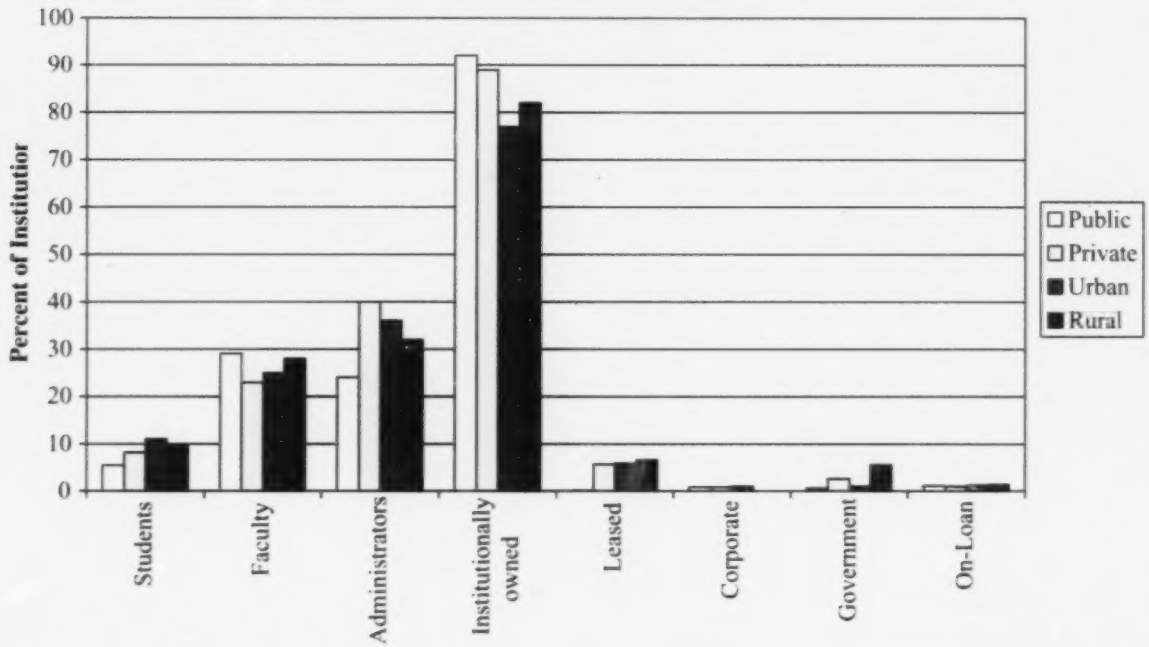
4.3.2 Institutional Ownership of Computers

An important feature of determining access to networks is to determine who owns computing resources. TAS findings indicate that approximately 80 percent of the computers on HBCUs campuses are owned by

OWNERSHIP OF DESKTOP OR LAPTOP COMPUTERS AT HBCUs (ENROLLMENT) Chart 6a



OWNERSHIP OF DESKTOP OR LAPTOP COMPUTERS AT HBCUs (PUBLIC/PRIVATE & URBAN/RURAL) Chart 6b



the institution itself. Administrators and faculty are in the second category of ownership while students, as indicated earlier in the report, own the fewest computers. HBCUs appear to be using few options other than direct ownership to obtain computers for their campuses. Given the need for students to obtain universal access to computers, other options could be considered such as leasing, using corporate-owned computers, government-owned computers, or computers loaned from sources in the community. **(See Charts 6a, 6b.)**

While it is essential that the institutions own computers to fill in obvious gaps in the capacity of students to own computers those institutional resources may impact students in a number of ways. By relying on institutionally owned computing resources, student access is dependent upon institutional funds, schedules, staffing, and availability. One technology professor at a four-year, rural, public HBCU observed, *"We have a number of computer labs at our University that are open seven days a week, 24-hours a day. One of our labs has 60 computers and it is packed all day every day."* ***Approximately 75 percent of students attending HBCUs do not own their own computers and must rely on institutional resources to connect to the Internet, World Wide Web, or other networks....a digital divide issue!***

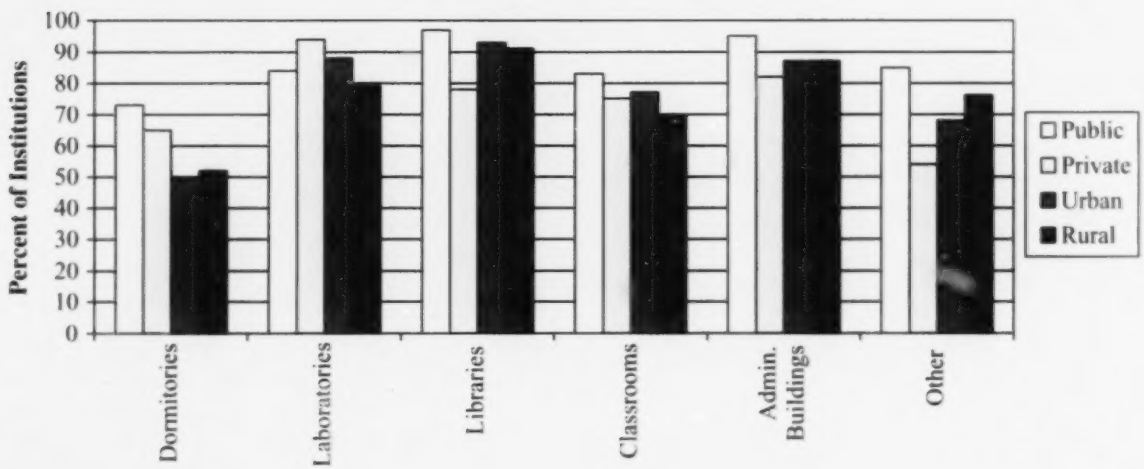
4.4 Connectivity, Capacity, and Facilities

4.4.1 Updated Wiring of Buildings

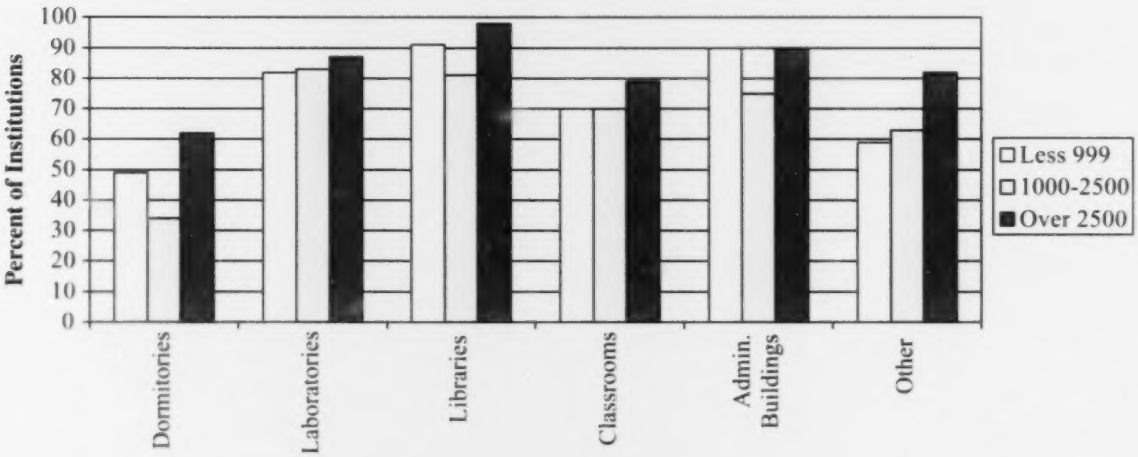
Key to installing campus networks is updating the wiring at buildings. Many HBCUs have old buildings and the TAS Team was interested to learn about the status of updating those buildings. Note: This information has not been verified by firsthand observation.

HBCUs report that over 50 percent of their buildings including dormitories have had their wiring updated. Libraries, laboratories, and administration buildings have the most updated wiring while classrooms and dormitories have the least. **(Charts 7a on this page and 7b on next page)**

HBCU BUILDINGS WITH UPDATED WIRING (PUBLIC/PRIVATE & URBAN/RURAL), Chart 7a



HBCU BUILDINGS WITH UPDATED WIRING (ENROLLMENT), Chart 7b



4.4.2 Campus Networks

Ninety-five percent of HBCUs indicate that they have campus networks composed of voice, data and voice, and/or data only. This indicates that most HBCUs institutions have some level of connectivity and offers a positive indication that HBCUs have made the initial investment required to begin laying the groundwork for providing networking and connectivity for the campus community. Not one HBCU reports distributing video over campus networks, although in Section 4.6 of the TAS it shows that 63 percent of HBCUs have basic videoconferencing capabilities. **(See Charts 9a and 9b on page 27.)**

4.4.3 Networking Campus Buildings

HBCUs network their buildings in a variety of ways. Fifty-one percent reported that they support voice and data on a single campus network for some, if not all, of their buildings. Fifteen percent reported single buildings being wired separately for voice and data. About 12.5 percent are wired for voice and data by geographic cluster on campus, and 12.5 percent reported being wired by functional cluster. Forty-one percent of the respondents indicated that all of their faculty offices are wired for both voice and data.

Since the TAS team was unable to inspect HBCU networks firsthand, it is surmised that a small number of the institutions may be reporting the existence of networks that are not yet functional. It is not possible to determine how many institutions may fall into that category; however, anecdotal information indicates that in the case of a few small, rural institutions, the backbone and infrastructure are in place but the connections have yet to be complete. For example, one campus official at a small, private, rural institution commented, *"We have laid the cables and wired our buildings and this fall we intend to have a fundraising campaign to pay for connecting computers to the campus backbone."*

4.4.4 TAS Standard Of Connectivity

Based on TAS data, 88 percent of HBCUs have access to T-1 lines from their local ISPs and operating companies and connect to their networks using single or multiple T-1 lines. In addition to T-1 connections available to the majority of HBCUs, other Internet connection options such as T-3, Fractional T-1, DSL, Frame Relay and ISDN are also available to over 30 percent of the reporting institutions. Given the broad availability of T-1 access in the marketplace, the TAS team determined that a minimum standard of connection for HBCUs to national networks was T-1 connectivity. The study did not have the resources to determine the actual use of T-1 on a campus by campus basis, but it is reasonable to assume that a single T-1 is not sufficient to provide a large campus with effective bandwidth for 21st Century connectivity. Although for a small campus a single T-1 may be very adequate, it is safe to say that the more bandwidth capacity an HBCU has the more possibilities that institution may have for participation in advanced projects such as Internet2. While limited bandwidth may not be the only reason, the fact that only one HBCU is listed on the official Internet2 Web site as an Internet2 member may be partially explained by HBCUs who have access to high-speed lines not using that access.

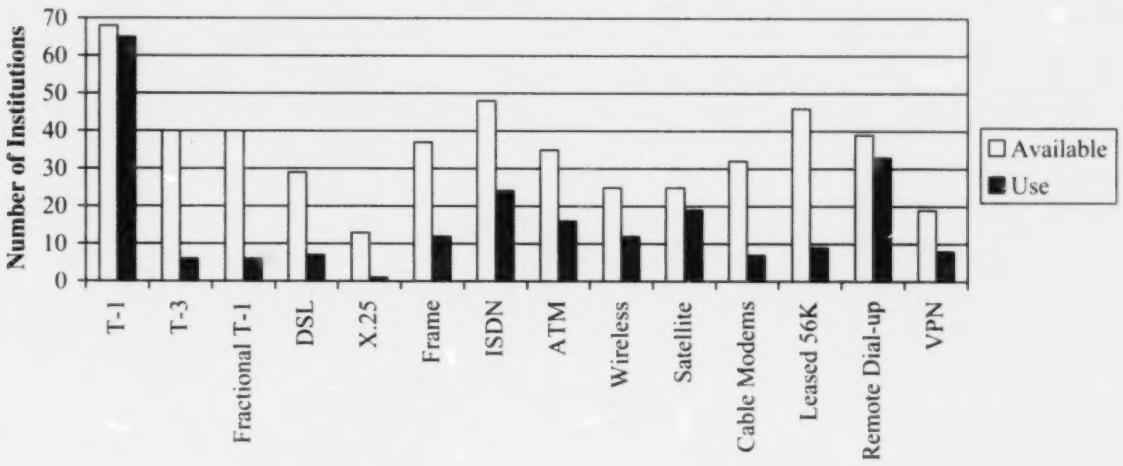
4.4.5 Comparison of Availability and Use of Services

T-1 bandwidth provides a specific speed rate and capacity suitable for basic functions, such as supporting limited numbers of classrooms for videoconferencing and providing Internet and World Wide Web connectivity. Larger bandwidth technologies such as T-3 or Asynchronous Transfer Mode (ATM) switches can provide more access for more users at a faster rate and can support different applications. The TAS results indicate that HBCU usage diminishes quickly for higher bandwidth lines and other technologies providing advanced computing capacity.

Results show that most HBCUs are connected at the T-1 level with the second most prevalent method of connectivity being ISDN lines. As reported earlier, 85 percent of the HBCUs report having T-1 lines available in their areas. Among these schools the majority of them are using the T-1 connections. Fifty percent of reporting institutions have T-3 connectivity available in their area while only 7.5 percent report using these high-speed lines. This low use of wide bandwidth may explain why only one HBCU is presently a part of Internet2.

ATM switching is available for 43 percent of institutions, and of those 43 percent having access, 45 percent indicate that they use the technology. Fractional T-1 services are available to 49 percent of HBCUs while only 15 percent use Fractional T-1. Regarding access to DSL, 52 percent of urban HBCUs have access to DSL, and 29 percent report using it and among rural institutions, 11 percent have access to DSL and 25 percent of those having access to DSL use it. Twenty-nine percent of HBCUs report having access to wireless and 43 percent of those with access are using it. Note: Responses to the wireless question may actually refer to use of wireless cellular services and not necessarily wireless connections to the Internet and World Wide Web. **(See Chart 8 on next page)**

AVAILABILITY AND USE OF CONNECTIVITY SERVICES AT HBCUs
Chart 8

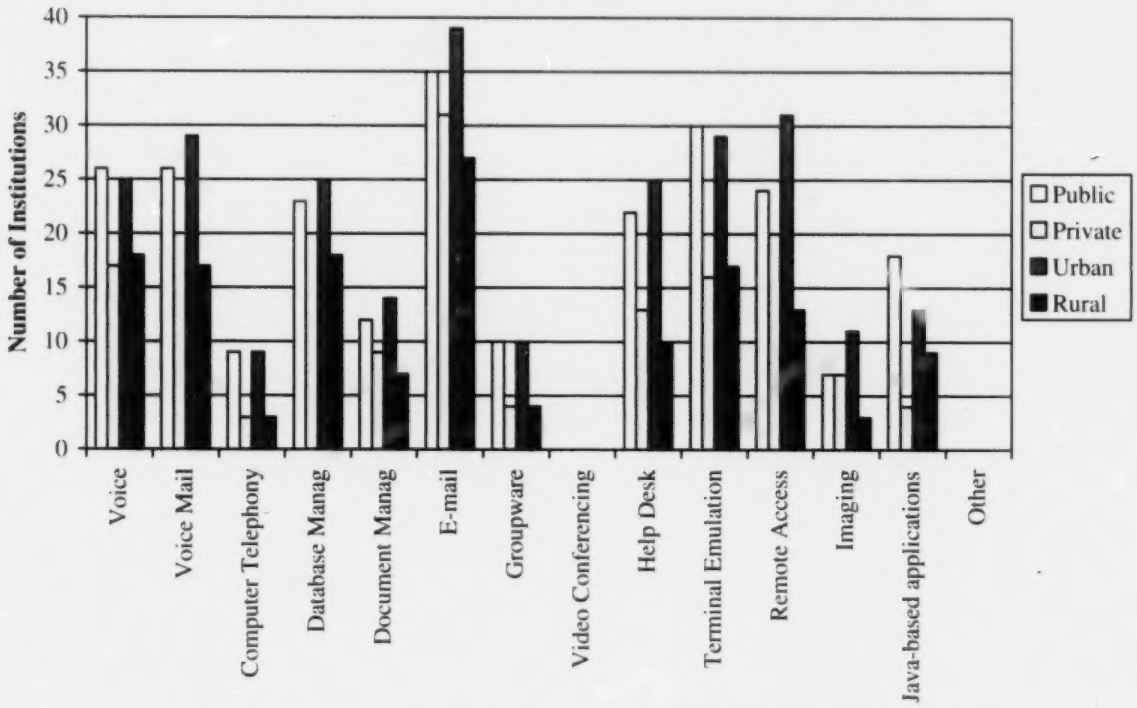


One question that emerges from this data is *WHY* are HBCUs, particularly private, rural institutions only using T-1 or ISDN when the marketplace has expanded to offer other options for high speed connectivity? This question is relevant in light of continuously expanding market demand for Web-based applications such as distance learning, telephony and Internet based videoconferencing, as well as the emerging projects such as Internet2.

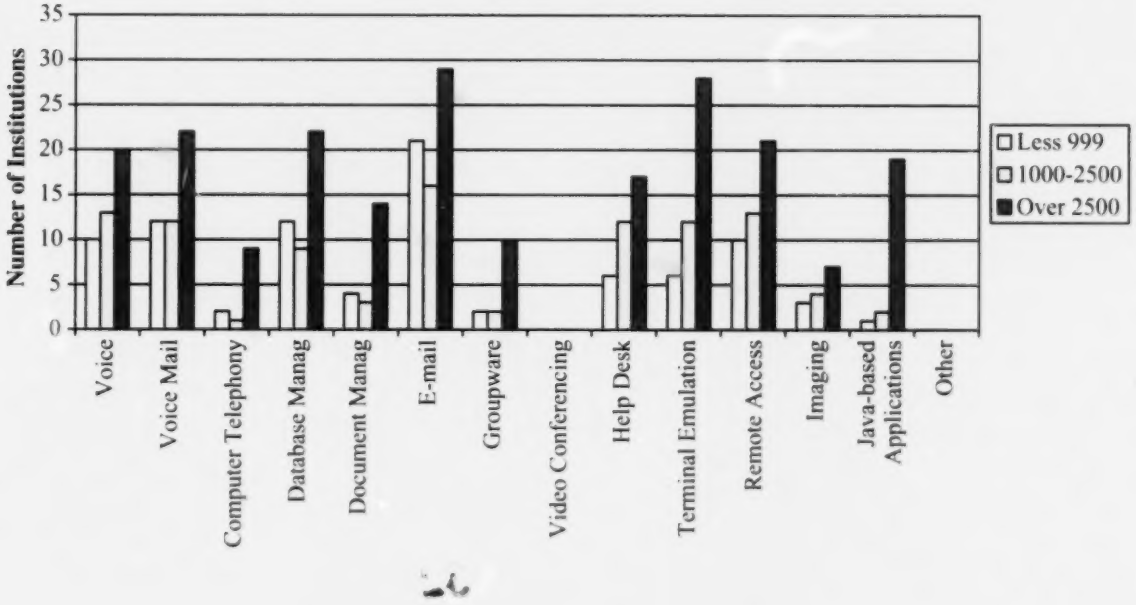
Looking at Table 8, it is clear that the majority of HBCUs are not using high-speed connections even if those connections are available in their communities. This raises the question as to whether or not HBCUs have the funds or technical staff to make full use of modern networks available to them. There is no indication in the TAS results that helps assess the reasons why the majority of reporting HBCUs do not go to the next stage in network design and use. However, the TAS team speculates that that the answers may lie in the areas of finance, lack of strategic planning, faculty motivation, and training. Expanded access to funding, further upgrades, and professional training may be needed to have fully functioning networks that take full advantage of available opportunities and resources and operate maximally. The opinion of the TAS Team after review of this data is...***Lack of connectivity beyond the T-1 level may be one of the key areas that hold back HBCUs from making the digital leap into the 21st Century!***

HBCU responses show a reasonable use of the network for administrative services and of other basic interconnection activities such as e-mail, voice mail, and help desk. However, responses also show that there is not much use of groupware software, which suggests that there is limited use of intranets, professional meetings, and professional collaboration over the Internet. Table 9 shows the use of particular applications at HBCUs: **(See Charts 9a and 9b on next page.)**

NETWORK APPLICATIONS USED AT HBCUs (PUBLIC/PRIVATE & URBAN/RURAL), Chart 9a



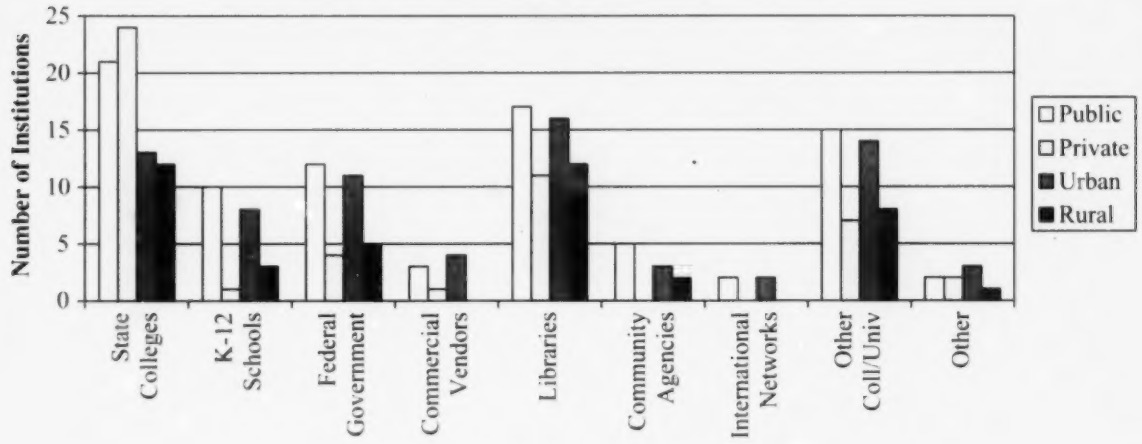
NETWORK APPLICATIONS USED AT HBCUs (ENROLLMENT) Chart 9b



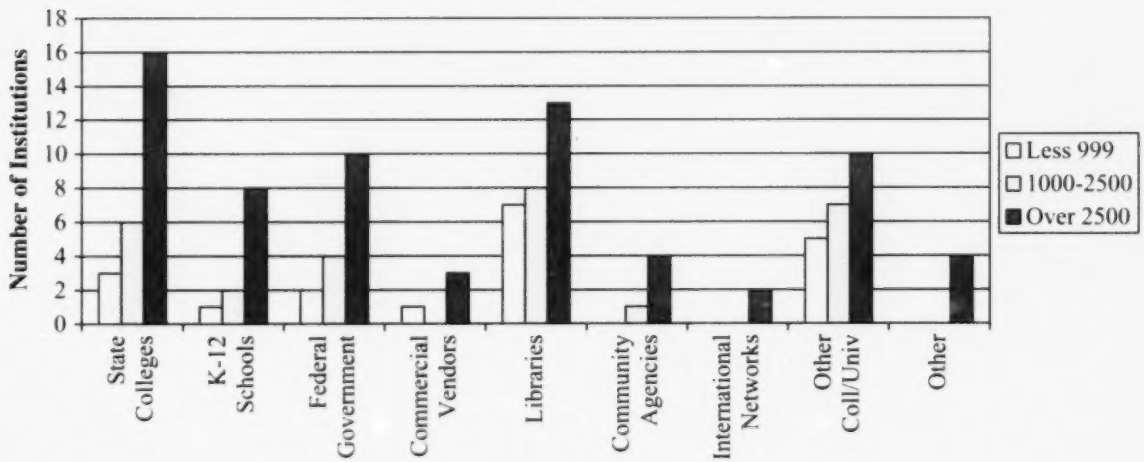
4.4.6 Global and National Networks

Among HBCUs, extensive connectivity to a global community appears to be underutilized. While baseline capabilities for connectivity exist within HBCUs, anecdotal evidence indicates that connectivity beyond the campus borders only extends to regional and/or statewide networks, or in some instances to the Federal Government. Out of 80 HBCUs only 31 percent indicate that they network with state college systems, 13 percent network with K-12 school districts, 20 percent with the Federal Government-a potential major source of funding and 5 percent with commercial vendors. Thirty-five percent network with libraries and 27 percent with other colleges and universities. International connectivity is virtually non-existent with only 2 percent indicating participation in international networks. **(See Charts 10a, 10b)**

HBCUs NETWORKED WITH NON-HBCU INSTITUTIONS (PUBLIC/PRIVATE & URBAN/RURAL), Chart 10a



HBCUs NETWORKED WITH NON-HBCU INSTITUTIONS (ENROLLMENT) Chart 10b



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An HBCU professor at a public urban institution believes that HBCUs would benefit from a national or global private network that connects all HBCUs, *"At our college, we specialize in African languages,"* the professor comments *"If we had a private network among HBCUs nationwide, we could benefit from professional exchange. We could share our African language expertise with other HBCUs...in exchange we would have access to the expertise of other institutions...such a network could extend to the Caribbean and Africa."*

By using greater access to worldwide resources, institutions can avail themselves of significant new applications of technology in the marketplace such as first employment interviews, multi-national and cross cultural distance learning, academic exchanges, research collaboration, distance learning. HBCUs should consider the need to *"Act locally...think globally."*

4.4.7 Vendors and Access to Networking Services

Thirty-six percent of responding HBCUs indicated that they use their state or local government as their vendors for access to the Internet, rather than small independent Internet service providers, Bell operating companies or various cellular, wireless or other service providers. Of the 36 percent using state or local government vendors, 50 percent of the public HBCUs and 22 percent of private HBCUs utilized this form of service. From this data, it appears that there is a significant distinction between public and private schools in their access and use of state and local systems. Also, there is also a difference in use by size of student enrollment, with smaller schools being less likely to employ such services.

Small, private, rural institutions may want to seek increased collaborative opportunities with either urban or other rural "wired" HBCUs in order to increase their access to networks and connectivity, and hopefully to enhance their overall networking and connectivity capacity.

While use of state or local government services may be a benefit to public and private urban HBCUs in terms of cost and access, it may also mean that these same institutions are more subject to political issues regarding their budgets and choices for technology. One HBCU technology professor from a public, rural institution comments, *"Next year the state is going to cut our budget. This will impact our ability to increase our number of classrooms with access to high-speed computing connections."*

Conversely, institutions that either do not have access to state or local government systems, or do not use them, may have an advantage in the ability to access change and innovation in the wider computing world. For example, some private institutions in higher education are choosing to bypass the expense of wiring of buildings and dormitories to connect students to the Internet, World Wide Web, and other campus networks by using high-speed wireless networks instead. Mount St. Mary's, a small, private, non-HBCU college in Newburgh, NY, found that the cost of installing a wireless network system to cover its campus, including parking lots and dormitories was $10,000 - $15,000, compared with the $150,000 estimated to wire just its classrooms and dormitories (*New York Times*, April 20, 2000). HBCUs that are dependent on local or state government vendors may not have the option to use wireless networks or to take immediate advantage of innovation.

4.5 Campus Backbone, Baseline, Capacity, and Facilities

The importance of the campus backbone is most meaningful to the overall mission and objectives of the institution. For institutions seeking to conduct advanced research, the type of hardware and software they install, plus the capacity of the campus backbone to support advanced computer modeling, high-speed connectivity, Web-based videoconferencing etc, may affect the type and size of Federal, state, local and/or private sector funding they can attract. Increasingly, Federal agencies are requiring all institutions to apply for contracts and grants online, and the ability to do that requires specific types of software and connection speeds. In addition, participation by HBCUs in advanced research projects may require certain types of imaging capacity and high-speed connectivity.

4.5.1 Description of Campus Backbone

Ethernet is "a shared media LAN (Local Area Network) where all stations on the segment share the total bandwidth."[8] HBCUs indicate that they have basic connection topographies and operating systems in place with 72 percent of all of the institutions reporting using Ethernet; 55 percent fast Ethernet; 89 percent using Windows NT; and 67 percent TCP/IP. Fifty-seven percent of the urban institutions report using Novell Netware Operating Systems and 51 percent of the rural institutions report using Novell Netware. Ninety percent of the urban institutions and 89 percent of the rural institutions are using Windows NT.

Seventy percent of public HBCUs use Ethernet and 79 percent of the private institutions use it as a part of their campus backbone. For four-year public and private urban and rural institutions, the top two technologies for campus backbone are Ethernet and Fast Ethernet. It is important to note that both protocols are industry standards.

Most of the HBCUs have the necessary protocol to support Internet applications with 93 percent of the urban HBCUs reporting that their networks support TCP/IP and 80 percent of the rural ones report the same. Among public institutions, 96 percent indicated that their networks support TCP/IP while 93 percent of private institutions reported that their networks support TCP/IP.

As we look at the data, we find that HBCUs appear to be invested in a solid foundation for their campus networks based on industry standards, but there may be some question as to whether these backbones can handle high-end video and other bandwidth intensive applications. The networks appear to be suitable for administrative and business functions but, as noted earlier may fall short if HBCUs choose to move into Internet2 and research projects that require high speed.capacity. Also, expansion of distance learning over the Internet will probably result in ever increasing demands for high-end video and the capacity to exchange elaborate files and images.

Regarding use of newer technology, 76 percent of the public institutions use Fast Ethernet in their campus backbones, while 50 percent of the private institutions use it. These differences may result in public institutions having campus backbones that are capable of providing faster connectivity as a result of their use of Fast Ethernet technology. HBCUs report very little use of FDDI, SONET, or Fiber Channel applications that can be used to support video.

[8] Tech Net Encyclopedia, July 2000

4.5.2 Access to The Campus Backbone

HBCU administration buildings and functions have greater access to the campus backbone while academic departments, instructional areas, and student-centered facilities such as dormitories, have less access, with the most notable exception being campus libraries. TAS data indicates that as long as students are accessing the campus network and the Internet from computer labs or libraries, their access is maintained. However, as they move outside of those locations their access diminishes substantially. While 88 percent of central administration offices have access to the campus backbone only 45 percent of the common areas of the dorms have access. While, admittedly, students can gain access to campus networks by connecting through phone lines, plug-in outlets in individual dorm rooms are preferable. Anecdotal evidence indicates that most dorm rooms do not provide plug-in access.

To take a closer look, public institutions report that 93 percent have central administration buildings connected to the campus backbone while 53 percent of the dormitory common areas are connected. Among private HBCUs, 92 percent of the central administration buildings are connected to the backbone while 48 percent of the dorms are connected. From the urban/rural perspective, 90 percent of the urban HBCUs have central administration buildings connected to the campus backbone and only 42 percent of the common dorm areas. Among rural schools, 85 percent of central administration is connected to the backbone while 52 percent of the dormitory common areas are connected. It would appear that most HBCU computing resources are invested in insuring that administration functions have connectivity while student access, at least from the location of campus dormitories, is a lower priority.

To contrast HBCU findings, the TAS looked at two other reports. First, the *Campus Computing Study* (Green 1999) reported that among all institutions of higher education, 62 percent of dormitory beds have network connections thereby providing students who own their own computers with direct access *on demand*. In the *America's 100 Most Wired Colleges* survey, it is reported that only 35 percent of all universities and colleges provide public computer equipment in labs or in dormitories. (YAHOO Internet Life, May 2000) However, although only 35 percent of the public dormitory areas of the YAHOO institutions are connected to networks, this number should be considered in light of the Campus Computing Study's finding that 62 percent of all individual dorm beds provide connectivity.

Since fewer than 25 percent of the majority of HBCU students own their own computers, HBCU students cannot access campus networks from their dorms, even through a telephone line, since they do not own the necessary equipment. Students must rely on common resources provided by their institutions, and there may be a number of factors that limit those institutional resources. One professor at a public, rural institution noted, *"Since male and female dorms are on opposite ends of the campus, our computer labs must be located with gender equity considerations for males and females. Even though our labs are open seven days a week, 24-hours a day, there is always a waiting list. Maintaining security for students walking from dormitories to computer labs during the middle of the night is quite a security problem."* Therefore, a finding of the TAS is...***at approximately 50 percent of HBCUs campuses, "on-demand" student access to computing resources is not available at a critical location-the campus dormitory.***

4.5.3 Computers and Servers

Public and private institutions report using the same types of computing resources, including computers and servers. Public institutions report using PCs 94 percent of the time and private institutions report their PC usage as 97 percent. Regarding their use of servers, 42, or 78 percent, indicate that they are using

"Intel-based" servers to power network applications. This compares to 37 percent and 44 percent using mainframe and midrange systems respectively for powering their networks.

These findings are consistent with the telecommunications industry in general, which is adapting to the newer "Intel-based" technology for their networks and are not relying on older legacy systems. This is important because it indicates schools are upgrading their networks and implementing the latest network techniques. As one way of measuring use of new technologies, TAS inquired into the use of the net computer, an inexpensive PC-like device that uses the network for applications and computing power. Twenty-four percent of the urban institutions reported using net computers; however, of that number, only 11 percent of the rural institutions reported using the newer, more innovative technology.

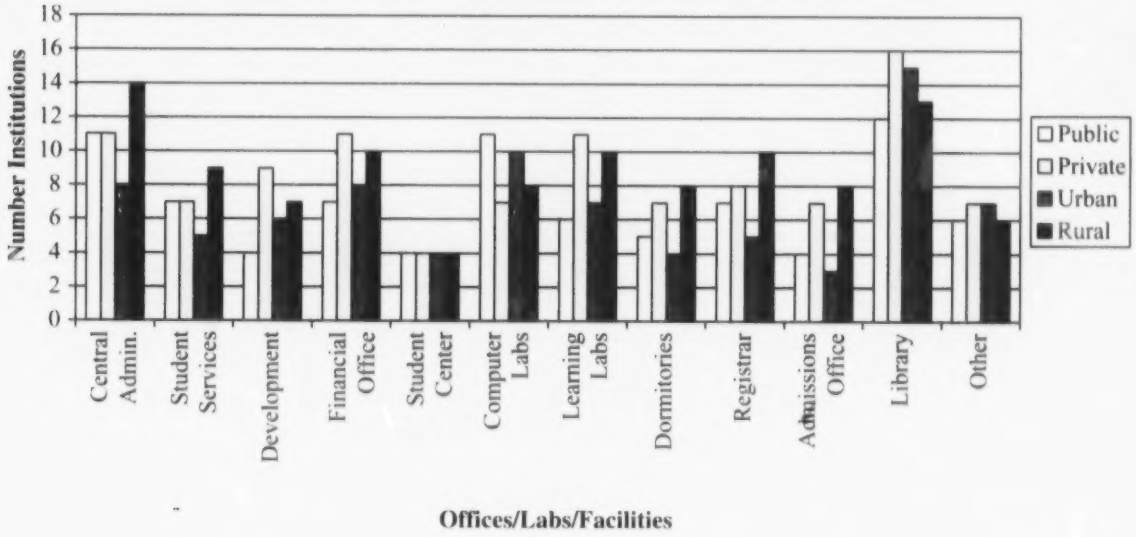
Regarding basic server applications such as file/print, e-mail and Web servers, the majority of the public and private HBCUs use these technologies for administrative and academic purposes. One hundred percent of the public and private institutions reported using file/print servers, over 90 of the public and private HBCUs use e-mail servers, and 97 percent of public and 82 percent of private institutions indicated using Web servers. There is no appreciable difference between the urban and rural institutions in this category.

In the area of specialized servers such as e-commerce, voice and/or video servers there is some limited use at HBCUs. Regarding the popular e-commerce applications, fewer than 20 percent of HBCUs report using e-commerce, whether viewed from the public, private, urban, or rural perspectives. Regarding voice servers, 30-40 percent reported using voice servers and 31 percent of those users are rural institutions. Twenty-two percent of HBCUs use video servers although of that 22 percent only 11 percent of those are rural HBCUs. Reviewing the use of specialized servers may provide an indication of some of the trends among HBCUs to integrate technology into the operations of the university and the educational process. For example, e-commerce may be applied to support online registration or video servers can be used to distribute educational content over the campus network. It appears from the data that these applications have begun in the HBCU community, but are not yet used extensively.

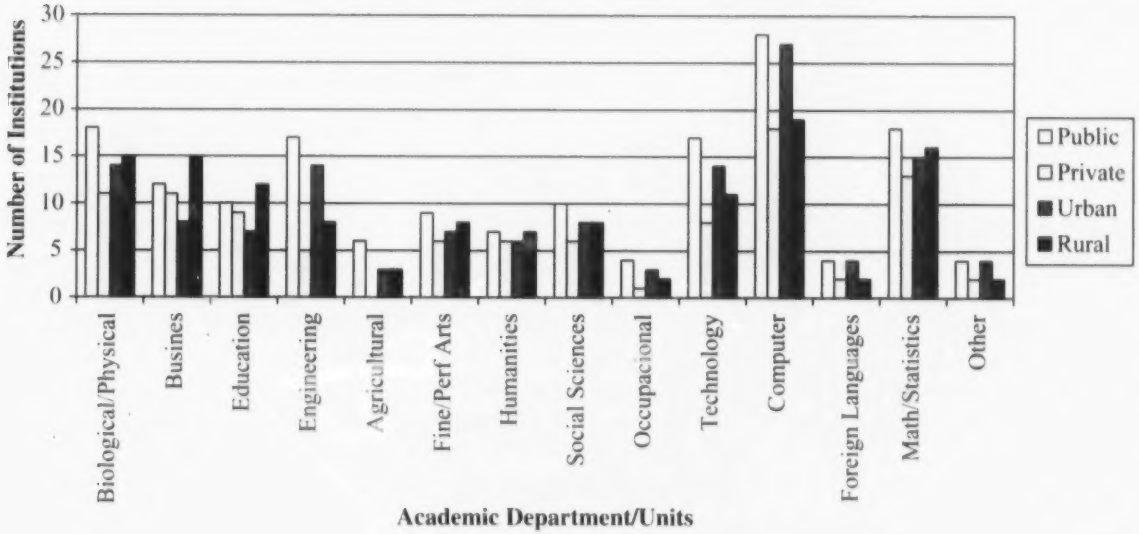
4.5.4 Location of Workstations

Specialized workstations are located in both administrative areas and academic departments at all HBCUs, with a slight edge given to workstations in administrative offices. Nineteen percent of urban HBCUs indicated that they have workstations in central administration while a surprising 40 percent of rural institutions have workstations in central administration. As would be expected, HBCUs reported that 60 percent of their computer science departments have specialized workstations, while 38 percent of their biological and science departments have them. Twenty percent of the HBCUs reported locating workstations in humanities and social science departments. Foreign language departments have the fewest workstations at nine percent. **(See Chart 11a, 11a continued, 11b, 11b continued. Note: Due to the amount of data two charts were required for 11a and 11b.)**

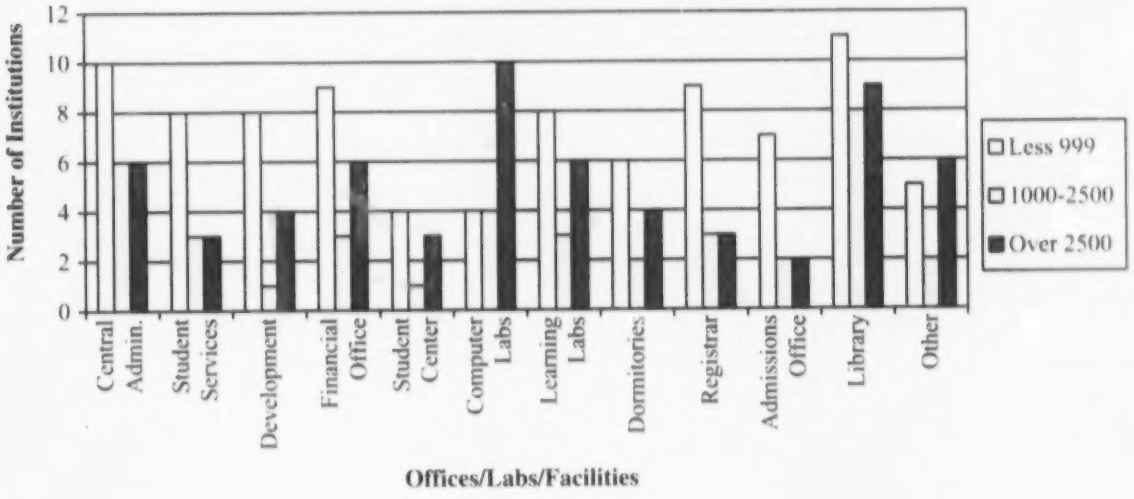
SPECIALIZED WORKSTATIONS IN HBCU ADMINISTRATIVE OFFICES/LABS/FACILITIES (PUBLIC/PRIVATE & URBAN/RURAL), Chart 11a



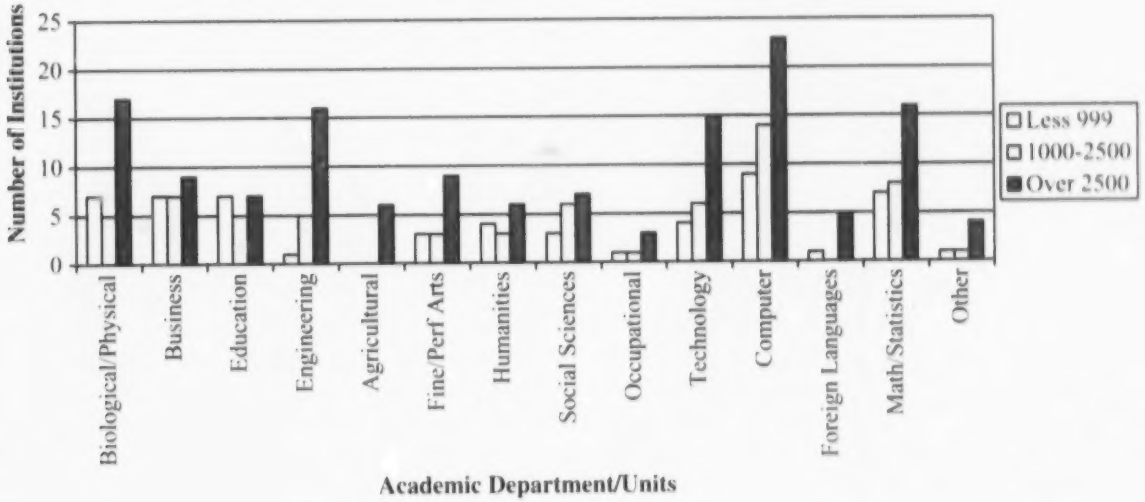
SPECIALIZED WORKSTATIONS IN HBCU ACADEMIC DEPARTMENT/UNITS (PUBLIC/PRIVATE & URBAN/RURAL), Chart 11a continued



SPECIALIZED WORKSTATIONS IN HBCU ADMINISTRATIVE OFFICES/LABS/FACILITIES (ENROLLMENT), Chart 11b



SPECIALIZED WORKSTATIONS IN HBCU ACADEMIC DEPARTMENT/UNITS (ENROLLMENT), Chart 11b continued



4.5.5 Cost of Connectivity

Forty-seven percent of urban HBCUs and 45 percent of the rural institutions, report spending $1,000-$5,000 per month to obtain connectivity and Internet services and eight

percent did not know. From the public and private perspective it doesn't change much with 39 percent of the public institutions spending $1,000-$5,000 per month for connectivity services and 46 percent of the private HBCUs spending a similar amount. Six percent of public institutions report spending between $5,000-$9,999 monthly and about 3 percent of private, and another 3 percent of public, report spending more than $10,000 per month.

Since a majority of the HBCUs report using T-1 lines, it can be assumed that much of the expense reported is to obtain use of those lines. Options for less expensive forms of connectivity may include DSL services available in urban areas, while HBCUs in rural areas without access to DSL may consider investigating options for wireless connectivity.

4.5.6 Network Security

Concerns about network security are becoming a major issue in the private and government sectors. Therefore, TAS included a few questions regarding login and password validation for access to all networks, applications, and data. Seventy-two percent of institutions indicated that they do require password validations.

When asked if the institutions were confident that their computers and networks are sufficiently secure, 55.6 percent of respondents were confident that their campus networks are secure. Seventy-five percent of private institutions indicated confidence in their computer security, while only 46 percent of the public institutions indicated such confidence. Since public institutions are also the larger ones, these findings may indicate that smaller, private institutions with fewer students, less hardware, and smaller campus networks have fewer areas of concern about network security.

While network security may be a more obvious concern for larger, public institutions, smaller private institutions would do well to monitor their network security as well since breaches in security, such as hackers, etc., can wreak havoc with institutional operations. In the future, insecure network operations may also have an impact on the capacity of HBCUs to participate in Federal or industry online programs that involve grants, contracts, and partnerships.

4.6 Web-based Services, Distance Learning, and Multimedia

4.6.1 Distance Learning and Multimedia

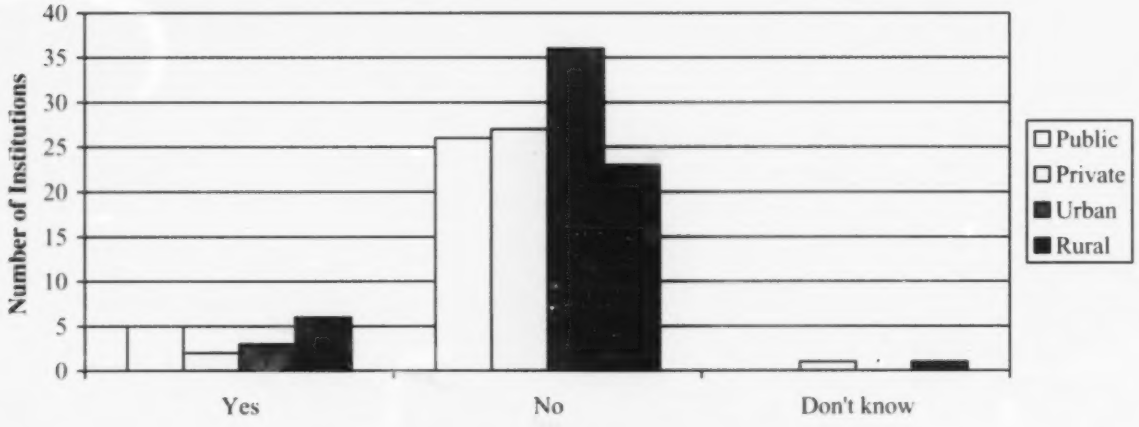
More than 50 percent of all HBCUs report that they have standard multimedia equipment, such as cameras, VCRs, projectors, and monitor installations used to support multimedia classrooms. Sixty-three percent

report that they have videoconferencing capability and 36 percent have audio teleconferencing. These technologies are used to support the HBCUs that participate in distance learning programs. Of the reporting HBCUs, 69 percent of them report having distance learning capabilities. Of the 69 percent who report having distance learning capabilities, 59 percent of them are urban institutions and 40 percent are rural, and 1 percent did not know.

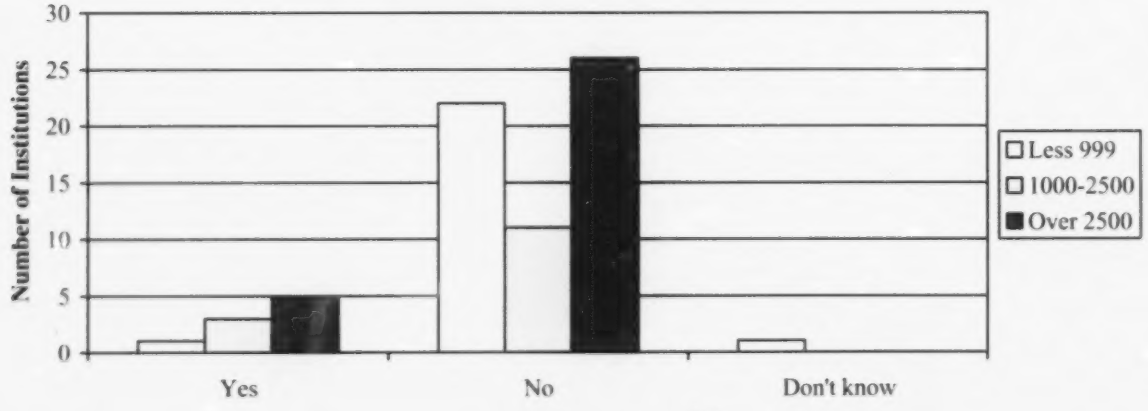
Fifty-six percent of HBCUs use two-way video/audio to support distance learning, 32 percent use satellite receivers, while 15 percent percent indicate that they use specialized Internet-based distance learning. Use of Internet-based distance learning technologies may increase as institutions invest in higher band width.

Fifty-eight percent of HBCUs indicate that they participate in distance learning. However, only 13 percent of them report that they currently offer degree programs by distance learning, 85 percent report that they do not offer degree programs, and 1 percent did not know. Of the 13 percent of HBCUs who report that they offer degree programs by distance learning, 33 percent are urban and 66 percent are rural. Larger HBCUs with enrollments of 2,500+ offer more degree programs by distance learning than smaller ones. **(See Charts 12a and 12b.)**

HBCUs OFFERING DEGREE PROGRAMS THROUGH DISTANCE LEARNING (PUBLIC/PRIVATE & URBAN/RURAL), Chart 12a



HBCUs OFFERING DEGREE PROGRAMS THROUGH DISTANCE LEARNING (ENROLLMENT), Chart 12b



Fifty-five percent of HBCUs participating in distance learning programs indicate that they do so primarily at the local level. While the TAS team did not precisely define "local level" means, anecdotal information indicates that videoconferencing is used by a number of HBCUs to support learning at extension locations in outlying communities within their home States.

Of the 85 percent of the institutions that report that they are not offering distance learning degrees programs at the present time, 48 percent of them indicate that they do plan to offer distance learning degree programs within the next three years, 20 percent of HBCUs indicate that they have no plans to offer distance learning degree programs within the next three years, and 30 percent did not know. The number of respondents reporting that they did not know their institutions' plans regarding distance learning may be an indication of weakness in the institutional strategic planning. As distance learning grows as an option for providing higher education and academic degrees the question of how HBCUs should participate further in the world of distance learning becomes an important administrative, strategic, and academic issue for colleges to evaluate. ***The TAS finds that of the reporting HBCUS, the majority of them are participating in distance learning programs, but 85 percent of them are not yet offering academic degrees through distance learning.***

4.6.2 Integration of Technology into Teaching

When asked whether faculty and academic units are effective at using the Internet and World Wide Web as a resource for curriculum and instruction, the average response was "somewhat effective." Predictably, HBCUs suggested that the library, computer science, and technology units were most effective while the foreign language, humanities, and fine arts departments were least effective. However, none of the respondents indicated that any of their academic or faculty units were "extremely effective" with use of the Internet in the classroom. TAS results indicate that HBCUs recognize that the use of Web-based applications opens up new possibilities for academic enhancement; however, TAS results also indicate that at the present time limited use is made of innovative Web-based applications. While results indicate primary HBCU use of technology to reach local student populations, extending the reach to global student populations coupled with market demands and interest stimulated by distance learning may afford great possibilities for all HBCUs.

4.7 Strategic Planning and Management Issues

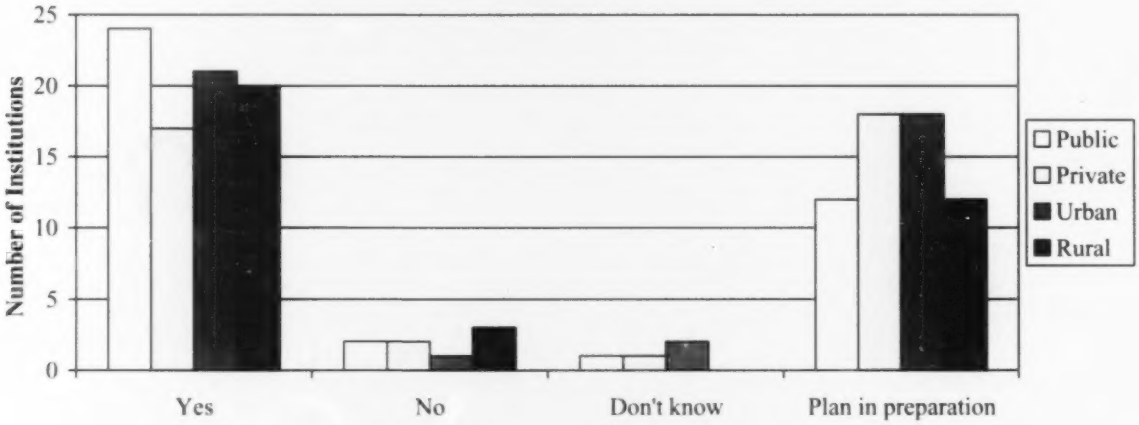
Critical to the successful utilization of computing technology is an institution's development of plans and policies about hardware, software, wiring, academic, and administrative uses; student usage; and a wide variety of other factors. In order to develop some idea of the activities taken by our institutions in this regard, respondents were questioned about studies assessing their institutions' technology needs and strategic planning related to information technology.

The development of strategic plans, which could include needs assessments, may encourage institutions to focus upon systemic relationships and to examine the utilization of information technology as a part of those relationships. ***It is encouraging to note that of the HBCUs responding to the TAS report, 52 percent indicated that they have a strategic plan and 42 percent reported that they are in the process of developing such a plan.***

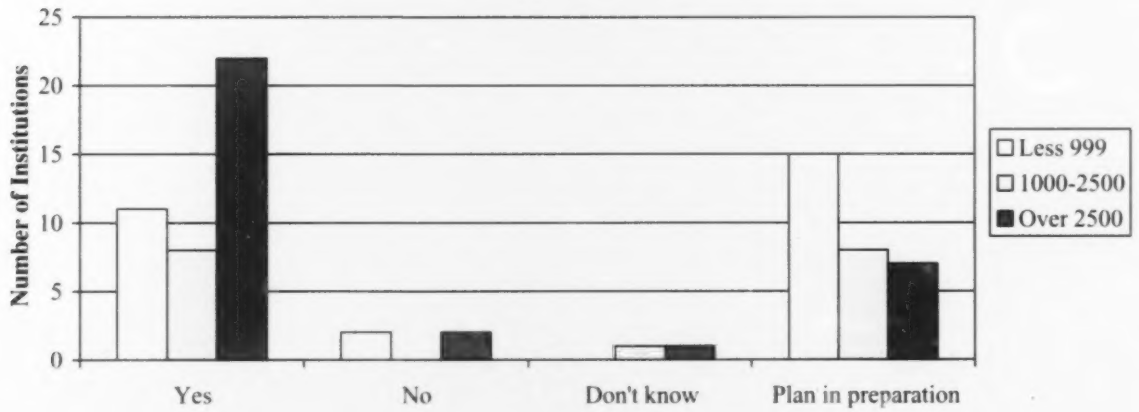
However, of those responding, only 65 percent have a process for measuring progress and updating their plans. The review and updating capacity is an important component of the effectiveness of strategic planning. Without this activity, institutions will not be able to adjust to unexpected changes in the implementation of their plans and to changing internal and external environmental conditions. In response to a TAS request for copies of those strategic plans, only three were provided.

The quality of the strategic planning process and of the adequacy of the plans cannot be determined in this study, but some recognition of their quality and of the assistance the institutions receive in developing their plans should be of critical importance for the future consideration and understanding of the capacity of HBCUs to provide students and faculty with competitive opportunities. **(See Charts 13a and 13b.)**

INSTITUTIONS HAVING STRATEGIC PLANS FOR THE DEVELOPMENT AND USE OF INFORMATION TECHNOLOGY (PUBLIC/PRIVATE & URBAN/RURAL), Chart 13a



INSTITUTIONS HAVING STRATEGIC PLANS FOR THE DEVELOPMENT AND USE OF INFORMATION TECHNOLOGY (ENROLLMENT), Chart 13b



4.7.1 Institutional Expectations

When asked to identify the most important technology issues for their institutions over the next five years, the vast majority of HBCUs identified seven items as extremely important issues: (1) providing universal access to the Internet, (2) providing adequate user support, (3) assisting faculty with integrating technology into instruction, (4) financing the replacement of aging hardware/software, (5) expanding/enhancing the campus network, (6) using IT effectively in distance education, and (7) enhancing library access to data bases and other institutions, etc.

These responses address not only issues of increased access but also items of enhancing how technology can be better used in teaching and learning. When the data are looked at from a public and private institutional perspective we find significant differences.

Overall, the private schools rate the seven issues identified above as more important than the public schools. Noting that the private schools are small and many are located in rural areas, this may suggest that the small rural institutions are more aware of the need to reach out for more computing resources that can enhance their capacity to offer and manage networks.

Also rated as very important to the HBCUs was linking libraries to a wide range of resources; improving overall speed/response time of network services such as e-mail and Web-access; linking PCs to larger computing systems; regularly updating hardware and software; linking dormitories to the campus network; and connecting desktop systems to share department or workgroup files. In reviewing these responses, based on characteristics of enrollment, we find minor differences between urban, rural, public, and private institutions.

Issues that were rated as lower priorities for the majority of the HBCUs include: creating plug and play networks for notebook computer users and digital image libraries. HBCUs should review these priorities since plug and play networks for laptop or notebook computers can provide students with flexibility to access networks. Scattering plug and play connections throughout campus and dorm rooms could increase access for those students who own their own computers. By not offering plug and play options, students must rely on access at campus labs, classrooms. and regular telephone lines.

The low prioritization of digital image libraries is another indication of the low use of wide bandwidth needed to support advanced digital images. This may be a refection of the fact that HBCUs are not using high-speed connectivity beyond the T-1 level that would be required to support certain types of research requiring them to use connections such as DSL, T-3, satellite, or wireless. As more HBCUs compete to participate in Internet2 and join in partnerships with government and industry, high-speed connectivity will probably become a more critical area of focus for strategic planning.

5.0 TAS CONCLUSIONS

In conclusion, in spite of difficulties that face many public HBCUs dependent on legislatures for public support or private HBCUs dependent on private sources to finance expensive technology, the TAS finds that the majority of HBCUs report the existence of some type of campus network that provides connectivity to the Internet and World Wide Web. Having these networks available to students attending HBCUs ensures that the predominately African-American student populations attending these historic institutions have access to technology that prepares them for the technology based workforce.

While campus networks are available at public, private, large, and small HBCU campuses located in urban centers and/or rural communities, the networks are unevenly distributed across campuses. Most of the computing and connectivity resources are focused at administrative buildings, but are not distributed equally to classrooms and dormitories. HBCUs may report campuses as "wired" and providing connectivity to the Internet and World Wide Web, but data indicates that all campus buildings do not provide connectivity to networks and the Internet, but provide it on a building by building basis.

HBCUs do own significant computing resources primarily located in computer labs, administrative and academic buildings, and libraries. These facilities provide students with access to the Internet, World Wide Web and other statewide and campus networks. However, individual student "on-demand" access to campus networks is seriously deficient due to either lack of student ownership of computers, lack of access from campus dormitories, or concentration of resources in selected locations. Computer ownership affects access to networks since students attending HBCUs only own computers at a rate of approximately one out of four, while approximately one out of two students attending non-HBCU institutions of higher education own computing technology. And, the TAS found that there is virtually no financial assistance in the form of loans or grants available to help students with limited financial resources to purchase computers and close this "computer ownership gap."

For the approximately 25 percent of the HBCU students who do own computers, they can access the Internet and World Wide Web from various locations on campus and from common areas in those dormitories that do provide connectivity. However, even the access of those students is impacted because fewer than 50 percent of the HBCUs report that their dorms provide connectivity. While it may be possible for students to access the Internet and campus networks through dorm room phone lines, it would be preferable for access to be provided by plug-in access in individual dorm rooms. For those students who do not own their own computers, access to networks requires reliance on institutional resources that may involve waiting for computer availability at computer labs and other facilities. In the view of the TAS Team, a digital divide issue is that a majority of HBCU students do not have universal access to campus networks and computing resources.

TAS also concludes that if HBCUs are to be competitive in the area of providing network technology supporting basic research, advanced research, e-commerce, imaging distance learning, and video applications, the institutions should dramatically increase their connectivity speed rates beyond the T-1 level.

Half of the HBCUs lack completed technology plans with strategies for updating those plans. This lack of a systematic and methodical approach to technology planning may result in campus networks not being reviewed, evaluated, and updated. This may impact future opportunities for HBCUs in taking advantage of funding, innovations, and increased competitiveness in the field of higher education.

One other concern of the TAS team is the finding that most HBCUs are connected to campus networks at the T-1 level. While T-1 connectivity provides basic access to the Internet, World Wide Web, and other networks, it is a first level of connectivity beyond dial-up modems. The question that rises from this finding is "WHY are HBCUs limiting themselves at that level?" This is an important question because it affects the capacity of HBCUs to participate in Internet2 and other research efforts that require high-speed connectivity. There is nothing definitive in the TAS results that helps assess why the majority of reporting HBCUs do not go to the next stage in network design and use. ***Lack of connectivity beyond the T-1 level may be one of the key areas that restrict HBCUs from making the digital leap into the 21st Century!***

5.1 Public vs Private Issues and Urban vs Rural

One issue that emerges from the TAS data is differences faced by the private versus the public institutions and urban vs rural as they deal with the digital divide. While factors related to these differences are not clear, they can be found in the areas of hardware, access, utilization, and expectations within the institutions. Some of the differences might be attributed to the fact that private HBCUs are predominately smaller than the public ones, while other differences may be due to the characteristics of public or private HBCUs or whether they are located in urban or rural areas. For example, small, private, rural HBCUs, and/or larger public, rural HBCUs do not have the same access to newer, less expensive technologies such as DSL due to local availability of such technologies. Also, private, rural institutions do not have the same access to state systems and networks as public rural or, urban institutions. However, while public, urban institutions may have greater access to state systems they also may have a higher degree of control over their budgets by state legislatures. This control may stifle flexibility of public institutions to introduce innovation or to experiment with different forms of connectivity.

For smaller institutions, technology could impact some disparities correlated to size differences. For example, economies of scale could be achieved by cooperation among HBCUs in purchasing materials, giving classes online, developing major courses of study through professional collaborative software, training staff and faculty collaboratively in the utilization of technology, and sharing the use of data bases for research and teaching, etc.

Institutional mentoring could be another area where smaller, rural, public and/or private HBCUs could benefit from the expanded connectivity of larger urban HBCUs. While frequently such cooperation occurs between small HBCUs and larger often non-minority institutions, the potential exists for HBCUs to increase their collaboration with each other.

The key to understanding the issues confronting smaller, private, rural institutions is to recognize that in contrast to prior times, geographical concerns are no longer a barrier in bringing institutions into true interaction and cooperation. Through networking and connectivity all HBCUs can expand the educational options for students; increase the level of opportunity for professional development for faculty, and enhance institutional stature and impact in the communities they serve. These goals can be achieved for all HBCUs-large, small, urban, rural, public, and private.

5.2 Highlights of Findings

Listed below are highlights of the TAS findings:

- Ninety-eight percent of HBCUs report some form of voice or data campus network.
- Fifty percent of HBCU campuses provide student access to the Internet, World Wide Web, and other networks at several locations on HBCU campuses, including computer laboratories, libraries, classrooms, dormitories and/or technology centers. However, among campus options for network access, dormitories provide the least for connectivity to the Internet and World Wide Web.
- Over 75 percent of HBCU students rely on institutionally provided computers in order to obtain access to the Internet and World Wide Web.
- There is basic equivalency in networking and connectivity services among TAS reporting institutions in urban areas, whether they are public or private. However, among rural, private institutions, there appears to be a significant technology gap.
- Approximately 25 percent or less of students attending HBCUs bring their own PCs or laptops to campus.
- Average HBCU expenditure for connectivity services ranges from $1,000 - $4,900 per month.
- The vast majority of HBCUs connect to networks and the Internet using T-1 lines while few report using high-speed capacity beyond the T-1 level. This may limit HBCU participation in Internet2.
- Over 85 percent of HBCUs do not offer distance learning degree programs at this time.
- Thirty-one percent of HBCUs plan to offer distance learning degree programs within the next three years.
- Forty-two percent of HBCUs report either partially completed strategic plans or no strategic plans.
- Seventeen percent of HBCUs report minimal use of collaborative groupware, online registration, e-commerce, and other applications.

APPENDIX A

U.S. Department of Commerce Press Release Announcing TAS Study

U.S. Department of Commerce - Sec. Daley Announces Contract for Study Aimed at Promoting Internet Access by Black Colleges

FOR IMMEDIATE RELEASE
Wednesday, October 6, 1999 Contact: Morrie Goodman
202/482-4883
Ranjit De Silva
202/482-7002
Internet: www.ntia.doc.gov

COMMERCE SECRETARY DALEY ANNOUNCES CONTRACT FOR STUDY AIMED AT PROMOTING INTERNET ACCESS BY BLACK COLLEGES

Washington, DC - Commerce Secretary William M. Daley today announced the award of a $90,027 contract for a study on the status of telecommunications capabilities of the nations's 116 historically black colleges and universities as part of a Clinton-Gore Administration initiative to help develop an information technology infrastructure that is accessible to all Americans. Daley said the study, to be conducted by the National Association for Equal Opportunity in Higher Education, will enable the Commerce Department to identify the technology and telecommunications needs of black college and university communities and help determine how the department can better assist them in accessing the Internet. "Access to information resources is critical to taking courses, researching, finding a job or public information," Daley said. "In a society that increasingly relies on computers and the Internet to deliver information, it is important to ensure that all Americans have access to information technology so that they can continue to be a part of our economic growth and prosperity."

The study is part of several initiatives the department is undertaking to try to close the "digital divide"--the gap between those with access to information technology and those without. The department's National Telecommunications and Information Administration, in a report issued in July, said that while more Americans than ever were connected to the Internet the gap between the information "haves" and "haves nots" persists and has widened significantly in the last few years, with minorities among those lacking access.

The contract for the study was awarded by the Commerce Department's NTIA. Besides helping NTIA determine the computer capabilities of the black colleges, the study will, among other things, help promote telecommunications innovation, research and engineering, foster the institutions' continued growth in the economy and increase opportunities for their participation in NTIA- supported projects. The NAFEO is the only membership organization of all 116 historically and predominantly black colleges and universities in the nation and administers a number of programs that seek to strengthen their institutional capacities.

APPENDIX B

LIST OF PARTICIPATING INSTITUTIONS

Alabama A&M University
Albany State University
Arkansas Baptist College
Barber-Scotia College
Benedict College
Bennett College
Bethune-Cookman College
Bishop State Community College
Bluefield State College
Bowie State University
Central State University
Charles R. Drew University of Medicine
Cheyney University of Pennsylvania
Chicago State University
Claflin College
Clark Atlanta University
Clinton Junior College
Coahoma Community College
Concordia College
Coppin State College
Delaware State University
Dillard University
Grambling University
J.F. Drake State Technical College
Edward Waters College
Elizabeth City State University
Fayetteville State University
Fisk University
Florida Memorial College
Fort Valley State University
Hampton University
Harris-Stowe State College
Hinds Community College - Utica Campus
Howard University
Interdenominational Theological Center
Jackson State University
Jarvis Christian College
Kennedy-King College
Knoxville College
Lane College
Langston University
LeMoyne-Owen College
Lewis College of Business
Lincoln University
Mary Holmes College
Medgar Evers College
Mississippi Valley State University
Morris College
Norfolk State University
North Carolina A&T State University
Oakwood College
Paine College
Paul Quinn College
Prairie View A&M University
Rust College
Saint Augustine's College
Saint Paul's College
Savannah State University
Selma University
Shaw University
Sojourner Douglass College
South Carolina State University
Southern University and A&M System College
Southern University at Shreveport-Bossier City
Southwestern Christian College
Spelman College
Talladega College
Tennessee State University
Texas College
Tougaloo College
University of the District of Columbia
University of Maryland-Eastern Shore
University of the Virgin Islands
Virginia State University
Voorhees College
West Virginia State College
Wilberforce University
Winston-Salem State University
York College/The City University of New York

**Less than 1 percent of HBCU responses were received after the deadline and are not included in the study.*

APPENDIX C - REFERENCES

U.S. Department of Commerce, U.S. Department of Agriculture, April 2000. *Advanced Telecommunications in Rural America: The Challenge of Bringing Broadband Services to All Americans.*

Broadband Guide, Design, June 1998, *Essentials of Campus Telecommunications Design Internet Web site.*

UC Berkeley Report. *Infrastructure, Topology and Media*, The Physical Network.

Jacqueline E. King, *Money Matters: The Impact of Race/Ethnicity and Gender on How Students Pay for College*, American Council of Education, 1999.

Kenneth C. Green, *Campus Computing Study*, 1999.

Louisiana State Plan for Educational Technology, 1997, Appendix B, *Vision for Technology Infrastructure.*

National Association for Equal Opportunity in Higher Education, *A Status Report of the Historically Black Colleges and Universities and NAFEO's Other Equal Opportunity Educational Institutions*, February 2000.

North Carolina Instructional Technology Plan Guide, *Technological Recommendations and Standards.*

University of California, Santa Barbara, 1993, *Standards for Communications Cabling in UCSB Buildings.*

YAHOO, Internet Life, *America's 100 Most Wired Colleges*, 1998, 1999, 2000.

APPENDIX D -- ABOUT NAFEO

The National Association for Equal Opportunity in Higher Education (NAFEO) is the national umbrella and public policy advocacy organization for 118 of the nation's historically and predominantly black colleges and universities - public and private, large and small, urban and rural, liberal arts, agricultural, research, scientific and technological institutions. Its mission is to champion the interests of the executive, legislative, regulatory, and judicial branches of Federal and State Government - to articulate the need for a system of higher education where race, ethnicity, socio-economic status, and previous educational attainment levels are not determinants of either the quantity or quality of higher education.

NAFEO was founded in 1969, at a time when the nation had before it, overwhelming evidence that educational inequality in higher education remained manifest. The 1954 Supreme Court decision, Brown vs Board of Education, and its progeny, focused national attention on the dual and unequal primary and secondary education systems nationwide and spurred two decades of litigation and legislation designed to redress the inequalities. But the initial debate paid little attention to the inequalities in higher education nor did it focus on the nation's Historically Black Colleges and Universities as equal opportunity institutions and, thus, a solution to some of the nation's higher education issues.

The TAS was conducted under the leadership of Henry Ponder, Ph.D., CEO and President, NAFEO, and former President of Fisk University. Providing contractual liaison and management oversight for TAS was Mildred Freeman, Director, Health Education/Sponsored Programs. Mrs. Freeman is a former Federal employee of the Health Resources Services Administration, U.S. Department of Health and Human Services. Providing statistical support for the TAS was Alicia Vargas, NAFEO statistician, and technical and computer support was provided by Ashley Bell, staff assistant, NAFEO.

APPENDIX E: ABOUT THE TAS TEAM

Stephanie Myers, M.A., TAS Principal Investigator, Public Policy Consultant
Mrs. Myers serves as a senior consultant to the National Association for Equal Opportunity in Higher Education (NAFEO). She is vice president of the R.J. Myers Publishing and Consulting Company, a company specializing in research and electronic information dissemination. Mrs. Myers is a former Federal official having served as Assistant Secretary for Public Affairs, U.S. Department of Health and Human Services, and Director of the Office of Commercial Space Transportation, U.S. Department of Transportation, where she was the senior regulatory official for licensed commercial space launches of communications satellites. She holds a M.A. in Urban Planning from Occidental College, Glendale. California and was a Coro Foundation Fellow in Public Affairs.

Antoinette Hubbard, M.S., M.A., Telecommunications Specialist
For the past 15 years, Antoinette Hubbard has worked at major U.S. corporations, including TRW, Baxter International, and Sara Lee. Her experience included design and management of major network installations, new technology planning, and national contract negotiations with suppliers. In 1996 she received an Eisenhower Foundation Fellowship to teach at Masaryk University in Brno, the Czech Republic. Ms. Hubbard has an MA in communications management from the Annenberg School, University of Southern California and an MA in Education and Human Development, Holy Name College. In her present position as Principal, Leadership by Design, she works with groups in the areas of project definition, leadership development, and resource optimization.

Eugene C. Royster, Ph.D., Evaluation Researcher
Dr. Royster's career spans the academic and applied research arenas. He served as professor and administrator at two HBCUS in Pennsylvania--Lincoln University and Cheyney University, and held similar positions at the University of Rochester, NY, and Temple University, PA. Dr. Royster conducted national research and evaluation studies for the Federal Head Start program and the first evaluation of the magnet schools program of the U.S. Department of Education. Prior to the TAS, his most recent research project was for the Kellogg Foundation on empowering philanthropy in communities of color. He has been awarded the Lester F. Ward Award for distinguished lifetime contributions by the Applied Sociology Association. He is a graduate of Yale University.

William Jordan, B.S., Internet Entrepreneur
William Jordan is Co-Founder, Chief Executive Officer, and Product Development Manager for MelaNet, LC, an Internet consulting company. Mr. Jordan is a graduate of Howard University in Washington, DC, with a B.S. in Electrical Engineering. He has industry experience in digital electronic design, software development, and embedded systems hardware and software design. He has led projects through the full development cycle from specifications development to product delivery, and his support and systems experience includes IBM, SUN, SGI, and HP in Unix and PC operating environments.

Lisa Hughes, M.A., Telecommunications and Virtual Office Specialist
Lisa Hughes worked for 14 years at AT&T in management positions in sales and training as a facilitator, consultant, and trainer specializing in professional, team, and organizational development. In 1994 she began her practice, Worklife Associates, to improve the quality of communication and relationships in a workplace characterized by changing cultures, structures, and technology. Ms. Hughes is a virtual office specialist and author of the book, *Virtual Office Planning Guide*. She holds a M.A. degree in Organizational Management, a B.A .in American Studies, and has more than 20 years experience helping people to connect and communicate successfully at work.

APPENDIX F: THE TAS INSTRUMENT

HBCU Technology Assessment Study (TAS)

Prepared by the
National Association For Equal Opportunity In Higher Education

NAFEO
Keeping the Doors of Opportunity Open ™

8701 Georgia Ave., Suite 200, Silver Spring, MD 20910
Telephone (301) 650-2440Fax No. (301) 495-3306
http://www.nafeo.org/

Thank you for participating in this technology assessment of the Historically Black Colleges and Universities Technology Assessment Study (TAS). This study, funded by the U.S. Department of Commerce, is designed to obtain a comprehensive evaluation of networking and on-line connectivity of Historically Black Colleges and Universities (HBCUs) in the United States and Virgin Islands. Results may assist government policy-makers and the private sector in developing future initiatives and support.

We would appreciate your completing the TAS instrument by February 28, 2000. You may return the completed questionnaire to NAFEO by mail at the address listed above, or fax the document to NAFEO at 301-495-3306.

If you have any questions regarding the TAS please call Stephanie Myers, TAS Principal Investigator, 202-863-0056, or email your questions to rjmpub@earthlink.net.

Note: To complete this questionnaire you may need the assistance of your Internet Service Provider or vendors who have assisted you with installing your campus network.

A. INSTITUTIONAL INFORMATION

1.0 Name of Institution_____

1.1 Mailing Address:_____

1.2 City: _____ 1.3 State: _____ 1.4 Zip:_____

1.5 Campus Website URL: _____

B. CAMPUS PLANNING AND POLICIES ABOUT COMPUTING

2. Has a technology needs assessment study been conducted at your institution? (*Please circle number left of the answer.*)

1) Yes 2) No 3) Don't know

2.1 If yes, year of Study _____ (If yes, if a report is available please provide a copy of the report when you return the survey.)

3. Does your institution have a strategic plan for the development and use of information technology? (*Please circle number left of the answer.*)

1) Yes 2) No 3) Don't know 4) Plan is in preparation

4. Does your institution have a process for measuring progress and updating your strategic plan? (*Please circle number left of the answer.*)

1) Yes 2) No 3) Don't know

If appropriate, Please Include copy of your strategic plan when you return the survey.

5. Does your institution require student computer ownership? (*please circle number on the right of the categories.*

		Require	Recommend	No	Don't know
5.1)	For all undergraduate students	1	2	3	4
5.2)	For graduate students	1	2	3	4
5.3)	For students in individual academic units or schools.	1	2	3	4

6. Does your institution have a computer instruction or computer competency requirement for all undergraduates? (*Please circle number left of the answer.*)

1) Yes 2) No 3) Don't know

If yes, Please include a statement or copy of your computer requirements.

7. What percentage of your students bring their own computers to campus? (*Please circle number left of the answer.*)

7.1) 75%-100% 7.4) Less than 25%
7.2) 50%-74% 7.5) Don't know
7.3) 25%-49%

8. Does your institution provide subsidies or financial incentives for students to acquire computers? *(Please circle number left of the answer.)*

1) Yes 2) No 3) Don't Know 4) Not Available

8.1 If yes, please indicate the method of incentive. *(Please circle number left of the answer.)*

1) Discounts 2) Financial aid 3) Free computers 4) Other

9. Does your institution have a special computer use fee or annual computer use charge for all students? *(Please circle number left of the answer.)*

1) Yes 2) No 3) Don't Know

9.1 If yes, what is the annual charge for 1999-2000?_____

C. CURRENT CAMPUS FACILITIES AND COMPUTING RESOURCES

10. What types of computers are currently used by your institution? *(Circle numbers left of the answers for all that apply.)*

10.1) Mainframe computers
10.2) Midrange computers
10.3) RISC servers
10.4) Intel-based servers
10.5) Workstations
10.6) PCs (Personal Computers)
10.7) Laptop/notebook/handhelds
10.8) Net Computer
10.9) Other (Please specify)_____
10.10) None of the above
10.11) Don't know

11. Where are the specialized workstations located on your campus? (e.g. cad/cam, statistical modeling, high end graphics, etc.) *(Please circle numbers left of the answers.)*

Offices/Labs/Facilities

11.1) Central Administration
11.2) Student Services
11.3) Development
11.4) Budget/Financial offices
11.5) Student Activity Centers
11.6) Public Access Computer Labs
11.7) Remedial Learning Labs
11.8) Dormitory common areas
11.9) Registrar
11.10) Admissions Office
11.11) Library
11.12) Others
11.13) None of the above
11.14) Don't know

Academic Departments/Units

11.15) Biological & Physical Sciences
11.16) Business
11.17) Education
11.18) Engineering
11.19) Agricultural Programs
11.20) Fine & Performing Arts
11.21) Humanities
11.22) Social Sciences
11.23) Occupational Programs
11.24) Technology Programs
11.25) Computer Science
11.26) Foreign Languages
11.27) Math/Statistics
11.28) Others (Please specify)
11.28) None of the above
11.29) Don't know

12. What is your best estimate of the percentage of the total number of desktop and notebook computers currently on your campus that are non-institutionally owned? (Include personal computers, leased computers, or on-loan computers)

1) _____% 2) Don't know *(Circle if applicable)*

13. Using percentages, what is your estimate of the ownership of desktop or laptop computers on your campus within the following groups?

13.1) Students _____%
13.2) Faculty _____ %
13.3) Administrators/staff_____%
13.4) Institutionally Owned_____ %
13.5) Leased_____%
13.6) Corporate _____%
13.7) Government_____%
13.8) On-Loan_____%
13.9) Don't Know_____%

14. What buildings on your campus have had the wiring infrastructure updated to accommodate networking and connectivity? *(Please indicate your responses in the appropriate boxes)*

Type of Building	Number of Buildings	Number of Buildings with Updated Wiring	Percent of Buildings with Updated Wiring
14.1) Dormitories			
14.2) Laboratories			
14.3) Library(s)			
14.4) Classrooms			
14.5) Administrative Bldgs.			
14.6) Other (Please Specify)			
14.7) Don't Know			

D. CAMPUS CONNECTIVITY

15. Do you have a campus network? (*Please circle number left of the answer.*)
1) Yes 2) No 3) Don't Know

16. Who is your local telephone service provider? _____.

17. Which of the following types of vendors provide Internet and networking connectivity services to your institution? (Please *circle numbers left of answers that apply.*)

17.1) Small Independent ISPs (Internet Service Provider)
17.2)
17.3) Large National ISPs
17.4) Local/Regional Bell Operating Companies (BOC)
17.5) Competitive/Alternative Access providers
17.6) Cellular Provider
17.7) Wireless Provider
17.8) PCS Service Providers
17.9) Paging and Message Providers
17.10) Cable TV operators
17.11) Satellite Based Services
17.12) Local/State Government Network Operators
17.13) Other (Please specify) _____
17.14) None of the above
17.15) Don't know

18. Which of the following Internet interconnection options are available from ISPs in your local area? *(Please circle numbers to left of answers that apply.)*

18.1) T-1/E-1
18.2) T-3/E-3
18.3) Fractional T-1/E-1
18.4) X.25
18.5) DSL (all types)
18.6) Frame Relay
18.7) ISDN
18.8) ATM
18.9) WAN switches
18.10) Wireless/PCS/Cellular
18.11) Satellite/microwave
18.12) Cable modems
18.13) 56/64kbit/sec leased lines
18.14) Remote dialup access
18.15) PBX
18.16) Virtual Private Networks
18.17) Other
18.18) None of the Above
18.19 Don't Know

19. Indicate which of the following Internet and Wide Area Network (WAN) service options are currently used by your institution by selecting the appropriate quantity? (*Please circle number under the applicable range/answer for each category.)*

	Connection Types	**1-20**	**21-50**	**51-100**	**100 +**	**Do not use**	**Don't know**
19.1)	T-1/E-1	1	2	3	4	5	6
19.2)	T-3/E-3	1	2	3	4	5	6
19.3)	Fractional T-1/E-1	1	2	3	4	5	6
19.4)	X.25	1	2	3	4	5	6
19.5)	DSL (all types)	1	2	3	4	5	6
19.6)	Frame Relay	1	2	3	4	5	6
19.7)	ISDN	1	2	3	4	5	6
19.8)	ATM	1	2	3	4	5	6
19.9)	WAN switches	1	2	3	4	5	6
19.10)	Wireless/PCS/Cellular	1	2	3	4	5	6
19.11)	Satellite/microwave	1	2	3	4	5	6
19.12)	Cable modems	1	2	3	4	5	6
19.13	56/64kbit/leased lines	1	2	3	4	5	6
19.14)	Remote dialup access	1	2	3	4	5	6
19.15	PBX	1	2	3	4	5	6
19.16	Virtual Private Networks	1	2	3	4	5	6
19.17)	Other_____	1	2	3	4	5	6
19.18)	None						

20. Which answer best describes how voice/data networks are distributed throughout your campus? (*Please circle number under the applicable answer to the right of the category.)*

	Categories	Voice	Data	Both	Don't Know	None
20.1	All campus buildings on a single network	1	2	3	4	5
20.2	Single Buildings Wired Separately	1	2	3	4	5
20.3	Buildings wired in geographically based clusters	1	2	3	4	5
20.4	Buildings wired in functional clusters	1	2	3	4	5
20.5	All faculty offices	1	2	3	4	5
20.6	Other, (Please specify) _____	1	2	3	4	5

21. Which of the following network infrastructure technologies are currently deployed on your campus to distribute Internet access and other network services? (*Please circle number of all that apply*)

21.1) Voice
21.2) Voice mail
21.3) Computer telephony
21.4) Database management
21.5) Document management
21.6) E-mail
21.7) Groupware
21.9) Help desk
21.10) Terminal emulation
21.11) Remote access
21.12) Imaging
21.13) Java-based applications
21.14) Other (Please specify)_____
21.15) None of the above

22. Which Network Management tools are currently used by your institution? (*Please circle numbers of all that apply*)

22.1) Network Management Software
22.2) Systems Management Hardware
22.3) Network test equipment
22.4) Cabling test equipment
22.5) Protocol Analyzers/Monitors
22.6) Management Utilities
22.7) Outsourced Management
22.8) Trouble shooting tools
22.9) Network Security tools
22.10) Other (Please specify)_____
22.11) None of the above
22.12) Don't know

23. What Peripherals are currently used by your institution? (*Please circle number of all that apply*)

23.1) Network printers
23.2) Network scanners
23.3) RAID
23.4) Power Management
23.5) External magnetic-disk storage
23.6) External optical-disc hardware
23.7) External tape hardware
23.8) Storage/Backup software
23.9) Tape libraries/jukeboxes
23.10) Other (Please specify)_____
23.11) None
23.12) Don't know

24. Which of the following servers are currently used by the administrative and/or Academic functions at your institution? *(Circle the numbers 1,2,3, or 4 to the right of each category.)*

No.	Category	Administrative	Academic	Don't Know	Do Not Use
24.1)	File/print servers	1	2	3	4
24.2)	Transaction servers	1	2	3	4
24.3)	Terminal servers	1	2	3	4
24.4)	Fax servers	1	2	3	4
24.5)	E-mail servers	1	2	3	4
24.6)	C. PBX/voice servers	1	2	3	4
24.7)	Web/HTTP servers	1	2	3	4
24.8)	Video servers	1	2	3	4
24.9)	Remote-access servers	1	2	3	4
24.10)	Communications servers	1	2	3	4
24.11)	Proxy servers	1	2	3	4
24.12)	E Commerce	1	2	3	4
24.13)	Other (please specify)	1	2	3	4

25. What is included in your campus network Infrastructure? *(Please circle numbers of all that apply)*

25.1) Network Interface Cards
25.2) Switches
25.3) Hubs/concentrators
25.4) Bridges
25.5) Security
25.6) Copper Cabling/connectors
25.7) Wireless LANs/WANs
25.8) Fiber cabling/connectors
25.9) Routers
25.10) DSU/CSU
25.11) Media converters
25.12) Frame Relay
25.13) Stand-alone Modems
25.14) Modem pools/banks
25.15) Directory Services
25.16) ISDN terminal adaptors
25.17) Middleware
25.18) Multiplexors/ inverse mux
25.19) Other (please specify)_____
25.20) None of the above
25.21) Don't know

26. Which of the following Internet tools are currently used by your institution? *(Please circle numbers of all that apply)*

26.1) Web development tools
26.2) Web application suite
26.3) Web server software
26.4) TCP/IP stacks
26.5) Web-to-database middleware
26.6) IPX-IP gateways
26.7) SNA-IP gateways
26.8) Firewalls/proxy servers
26.9) Electronic Commerce
26.10) Web site management
26.11) Web usage monitoring
26.12) Java development tools
26.13) Web design services
26.14) Web hosting
26.15) Secure web server
26.16) Internet Service Providers
26.17) Online Services
26.18) None of the above
26.19) Other (Please specify)_____
26.20) Don't know

27. Please estimate the overall percentage of the computers in your campus labs and libraries, classrooms, dorms and technology centers that provide student access to your campus network and the Internet? 1)_____%. 2) Don't know *(Please circle if applicable)*

28. What types of Internet connections are in use by the following academic departments? (*Circle the numbers of all that apply for each category.)*

	Categories	Biological & Physical Sciences	Business	Education	Engineering	Agricultural Programs	Fine & Performing Arts	Humanities	Social Sciences	Occupational Programs	Computer Science	Foreign Languages	Math/Statistics
28.11)	T-1/E-1	1	2	3	4	5	6	7	8	9	10	11	12
28.12)	T-3/E-3	1	2	3	4	5	6	7	8	9	10	11	12
28.13)	Fractional T-1/E-1	1	2	3	4	5	6	7	8	9	10	11	12
28.14)	X.25	1	2	3	4	5	6	7	8	9	10	11	12
28.15)	DSL	1	2	3	4	5	6	7	8	9	10	11	12
28.16)	Frame Relay	1	2	3	4	5	6	7	8	9	10	11	12
28.17)	ISDN	1	2	3	4	5	6	7	8	9	10	11	12
28.18)	ATM	1	2	3	4	5	6	7	8	9	10	11	12
28.19)	WAN switches	1	2	3	4	5	6	7	8	9	10	11	12
28.20)	Wireless/PCS/ Cellular	1	2	3	4	5	6	7	8	9	10	11	12
28.22)	Satellite/ Microwave	1	2	3	4	5	6	7	8	9	10	11	12
28.23)	Cable modems	1	2	3	4	5	6	7	8	9	10	11	12
28.24)	56/64kbit/sec leased lines	1	2	3	4	5	6	7	8	9	10	11	12
28.25)	Remote dialup Access	1	2	3	4	5	6	7	8	9	10	11	12
28.26)	Other	1	2	3	4	5	6	7	8	9	10	11	12
28.27)	None												
28.28)	Don't know	1	2	3	4	5	6	7	8	9	10	11	12
28.29	Do Not Use	1	2	3	4	5	6	7	8	9	10	11	12

29. What is the estimated monthly cost for your institution to obtain connectivity and Internet services? *(Please circle number next to the amount range that applies.)*

1) $1 -- $99
2) $100 - $999
3) $1,000 - $4,999
4) $5,000 - $9,999
5) $10,000 - $19,999
6) $20,000 - $29,999
7) $30,000 - $39,999
8) $40,000 - $49,999
9) $50,000 and above
10) no cost
11) Don't know

30. Do you require login and password validation for access to all networks, applications and data? *(Please circle the number of all that apply)*

1) Yes 2) No 3) Don't know

31. Are you confident that access to your computers and networks are sufficiently secure? *(Please circle number to left of answer)*

1) Yes 2) No 3) Don't Know

E. CAMPUS BACKBONE

32. Which topographies are used to distribute Internet access throughout your campus? *(Please circle number left of answers that apply.)*

32.1) Ethernet
32.2) Fast Ethernet
32.3) ATM Other
32.4) FDDI
32.5) XDSL
32.6) Token Ring
32.7) Fiber Channel
32.8) SONET
32.9) Other (Please specify) _____
32.10) None of the above
32.11) Don't know

33. Which of the following Network Operating Systems/Protocols are used throughout your campus network? *(Please circle numbers left of the answers that apply.)*

33.1) Netware (Novell)
33.2) Windows NT
33.3) LAN Server
33.4) VINES
33.5) Appletalk
33.6) Pathwork
33.7) TCP/IP
33.8) SNA
33.9) Other _____
33.10) Don't have throughout the campus
33.11) Don't know

F. ORGANIZATION, ACCESS, AND CONNECTIVITY ENVIRONMENT

34. In your opinion, what are the priorities for networking on your campus? (*Rate each category on scale of 1 to 5 with one being not important to five being most important by circling the appropriate number. Or circle 6 for Don't know*

		Not Important				Very Important	or Don't Know
34.1)	Connecting desktop systems to share departmental or workgroup files	1	2	3	4	5	6
34.2)	Campus-wide mail systems on a network	1	2	3	4	5	6
34.3)	Supporting instructional labs and clusters	1	2	3	4	5	6
34.4)	Linking PCs to larger computing systems.	1	2	3	4	5	6
34.5)	Linking PCs to your library System.	1	2	3	4	5	6
34.6)	Linking with regional or national networks	1	2	3	4	5	6
34.7)	Creating WWW pages for' departmental use and course resources	1	2	3	4	5	6
34.8)	WWW/Network access for all students	1	2	3	4	5	6
34.9)	Network printing	1	2	3	4	5	6
34.10)	Digital image libraries/archives	1	2	3	4	5	6
34.11)	Creating "plug & play" network for notebook computer users	1	2	3	4	5	6
34.12)	Linking dormitories to the campus network.	1	2	3	4	5	6
34.13)	Linking your li' rary to a wider range of resources	1	2	3	4	5	6

35. What facilities and departments on your campus have access to the campus backbone? *(Please circle all that apply.)*

Offices/Labs/Facilities

35.1) Central Administration
35.2) Student Services
35.3) Development
35.4) Budget/Financial offices
35.5) Student Activity Centers
35.6) Public Access Computer Labs
35.7) Remedial Learning Labs
35.8) Dormitory common areas
35.9) Registrar
35.10) Admissions Office
35.11) Library
35.12) Others (Please Specify) _____
35.13) None of the above
35.14) Don't know

Academic Departments/Units

35.15) Biological & Physical Sciences
35.16) Business
35.17) Education
35.18) Engineering
35.19) Agricultural Programs
35.20) Fine & Performing Arts
35.21) Humanities
35.22) Social Sciences
35.23) Occupational Programs
35.24) Technology Programs
35.25) Computer Science
35.26) Foreign Languages
35.27) Math/Statistics
35.28) Others (Please Specify) _____
35.29) None of the above
35.30) Don't know

36. Who has access to the Internet on your campus and where can they have this access? *(Please circle numbers In the boxes provided)*

		GROUPS				
	AREA	**Undergraduate**	**Post-graduate**	**Faculty**	**Administrators**	**Staff**
36.1)	Dormitories: Common Areas	*1*	*2*	*3*	*4*	*5*
35.2)	Dorm Rooms	*1*	*2*	*3*	*4*	*5*
36.3)	Office	*1*	*2*	*3*	*4*	*5*
36.4)	Library	*1*	*2*	*3*	*4*	*5*
36.5)	Laboratory	*1*	*2*	*3*	*4*	*5*
36.6)	Classrooms	*1*	*2*	*3*	*4*	*5*
36.7)	Other Common Areas (Please Specify) _____	*1*	*2*	*3*	*4*	*5*
36.8)	None of the Above	*1*	*2*	*3*	*4*	*5*
36.9)	Other (Please Specify) _____	*1*	*2*	*3*	*4*	*5*
36.10)	Don't Know	*1*	*2*	*3*	*4*	*5*

37. Which users are assessed a fee for E-mail and Internet access? (Please *circle the number of all that apply*).

7.1) Undergraduate students
37.2) Faculty
37.3) Staff
37.4) Graduate students
37.5) Administrators
37.6) Other (Please specify)
37.7) None
37.8) Don't know

38. Are you aware of the "E" rate for universal access to the Internet provided by the Federal Government to academic institutions (*Please circle number to left of answer*)

1) Yes 2) No 3) Don't know

38.1 If yes, does your institution benefit from the "E" rate? (*Please circle number to left of answer*).

1) Yes 2) No 3) Don't Know

39. Are your academic and administrative computing departments managed in a combined unit? *(Please circle number left of answer)* 1) Yes 2) No 3) Don't Know

39.1 If yes, to whom does the combined unit report to?

39.1) President
39.2) V.P. Academic Affairs
39.3) Vice President for_____
39.4) Dean
39.5) Other (please specify) ____
39.6) None of the above
39.7) Don't know

40. If the academic and administrative computing departments are managed separately whom do they report to? (Please c*ircle numbers of all that apply*)

40.1	**Academic Computing**	40.2	**Administrative Computing**
1)	President	1)	President
2)	V.P. Academic Affairs	2)	V.P. Academic Affairs
3)	Vice President for _____	3)	Vice President for _____
4)	Others (please specify) _____	4)	Others (please specify) _____
5)	Don't know	5)	Don't know

41. Is your campus part of a multi-campus system with shared computing resources? *(Please circle number to the left of the answer.)*

1) Yes 2) No 3) Don't Know

42. Are you part of a state network system? *(Please circle number left of the answer.)*

1) Yes 2) No 3) Don't Know

43. Is your campus networked with institutions outside of your campus? (*Please circle the number to the left of all that apply)*

43.1)	State College Systems	43.6)	Local Community Agencies
43.2)	K-12 school systems	43.7)	International Networks
43.3)	Federal Government Agencies	43.8)	Other Colleges/Universities
43.4)	Commercial Vendors	43.9)	Other (Please specify)_____
43.5)	Libraries	43.10)	None of the above
		43.11)	Don't Know

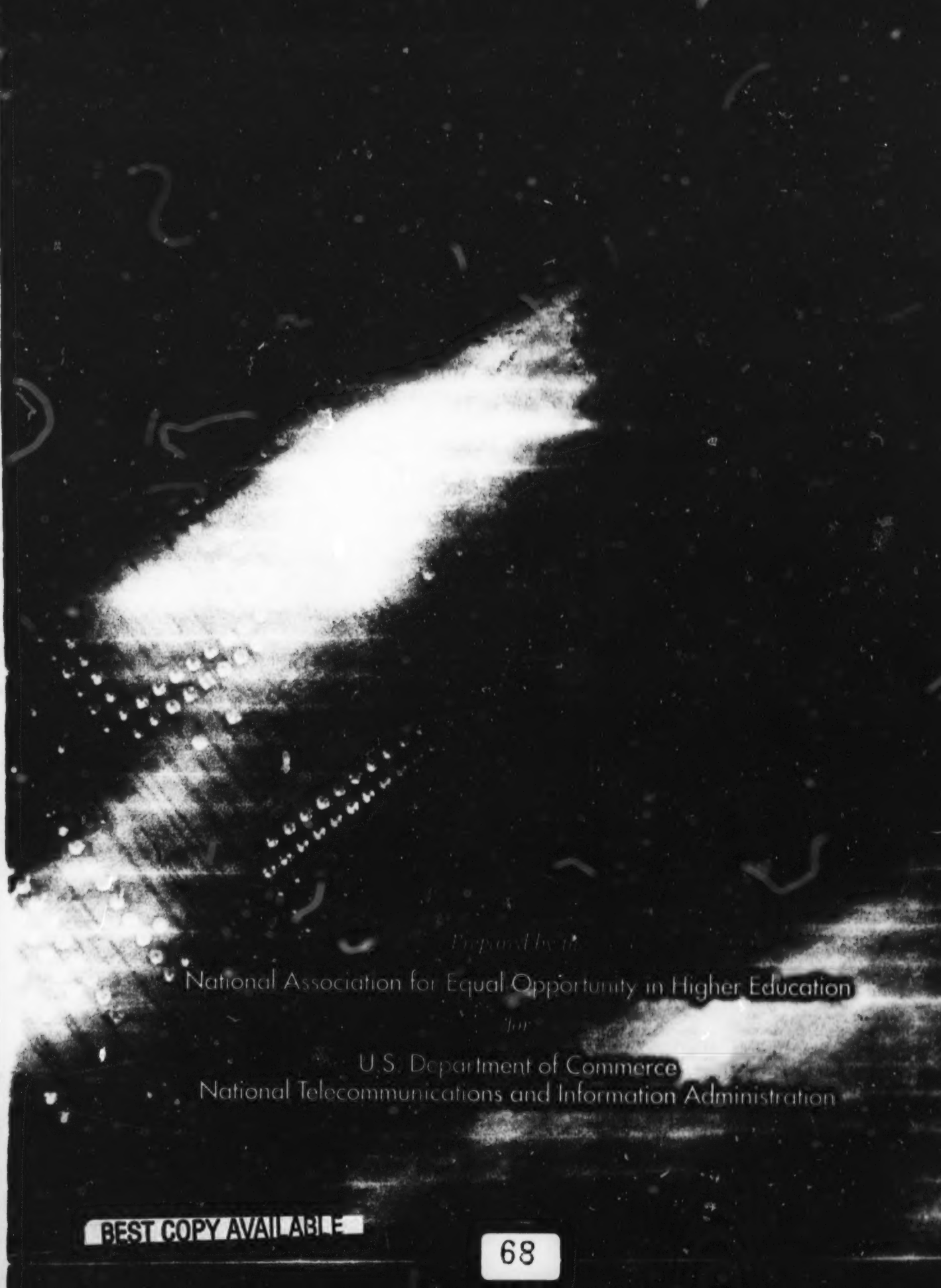
44. From your perspective, how well are faculty and academic units using the Internet and WWW as a resource for curriculum and instruction? *(Please rate each category on this scale of 1 to 5 with one being not well to five being most well by circling the appropriate number. **Or** you circle 6 for Don't know)*

	Academic Field/Program	**Not Important**			**Very Important**		**Don't know**
44.1)	Biological & physical sciences	1	2	3	4	5	6
44.2)	Education	1	2	3	4	5	6
44.3)	Engineering	1	2	3	4	5	6
44.4)	Fine & performing arts	1	2	3	4	5	6
44.5)	Humanities	1	2	3	4	5	6
44.6)	Social science	1	2	3	4	5	6
44.7)	Occupational Programs	1	2	3	4	5	6

44.8)	Business	1	2	3	4	5	6
44.9)	Agricultural Programs	1	2	3	4	5	6
44.10)	Technology Programs	1	2	3	4	5	6
44.11)	Foreign Language	1	2	3	4	5	6
44.12)	Math/Statistics	1	2	3	4	5	6
44.13)	Computer Science	1	2	3	4	5	6
44.14)	Library	1	2	3	4	5	6

45. Please rate these information technology issues confronting your institution on a scale of 1 to 5 in terms of their importance over the next two or three years are: (*Please follow the same instructions for Question Number 44.*)

	Statement	**Not Important**			**Very Important**		**Don't know**
45.11	Providing universal access to the Internet	1	2	3	4	5	6
45.12	Providing adequate user support.	1	2	3	4	5	6
45.13	Assisting faculty in integrating technology into instruction.	1	2	3	4	5	6
45.14	Financing the replacement of aging hardware/software.	1	2	3	4	5	6
45.15	Expanding/enhancing the campus network	1	2	3	4	5	6
45.16	Licensing (digital) content from publishers	1	2	3	4	5	6
45.17	Using IT effectively in distance education	1	2	3	4	5	6
45.18	Learning about how to install a network	1	2	3	4	5	6
45.19	Restructuring/reorganizing IT service units (computing, libraries, etc.)	1	2	3	4	5	6
45.20	Enhancing library access to databases, other institutions, etc.	1	2	3	4	5	6
45.21	Other (Please be specific below) _____	1	2	3	4	5	6
45.22	Don't know	1	2	3	4	5	6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